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ON MAMMALS COLLECTED IN SIAM.

BY C. BODEN KLOSS, F.Z.S.

(With two plates.)

Geographical:—Description of districts visited.

Systematic:—

*Presbytis argenteus*, nov.

*P. cristata koratensis*, subsp. nov.

*Macaca nemestrina indochinuesis*, subsp. nov.

*M. irus atriceps*, subsp. nov.

*Viverricula malaccensis thai*, subsp. nov.

*Tupaia glis cambodiana*, subsp. nov.

*T. glis olivacea*, subsp. nov.

*Tamias macclellandi liantis*, subsp. nov.

*Menetes berdmorei peninsularis*, subsp. nov.

*Rattus rajah koratis*, subsp. nov.

*R. rajah kramis*, subsp. nov.

*Rattus rattus lanensis*, subsp. nov.

*R. rattus kramensis*, subsp. nov.

*R. rattus mesanis*, subsp. nov.

*R. rattus koratensis*, subsp. nov.

*Bandicota siamensis*, nov.

*Capricornis sumatraensis annectens*, subsp. nov.

Four squirrels in the present collection were also new:—

*Sciurus caniceps inexpectatus*, mihi.

*S. atrodorsalis pranis*, mihi.

*S. atrodorsalis tuchin*, mihi.

*S. jinlaysoni trotteri*, mihi.

They are described in full here, but the names and preliminary diagnoses were first published in the Journal of the Natural History Society of Siam, Vol. II, p. 178 (Dec. 1916).

In 1916 I again spent some local leave in Siam, arriving in Bangkok at the end of September with three Dyak assistants by whose aid 340 specimens of mammals, 420 of birds\* and smaller series of reptiles and batrachians were obtained in about thirty-three days of collecting.

At Bangkok I was told I had arrived at about the worst time possible for collecting, since near the end of the year the rains are at their worst, the low-lying parts of the country flooded and the streams and rivers much swollen. This, indeed, I found to be the case; we were everywhere stopped by floods; and instead of collecting at chosen localities we had to work at places where one finally starts for these. We were hardly in forest at any time, and owing to the fact that the state of the country made it almost impossible for us to reach good collecting-ground in the districts I visited, if we were to do any collecting at all in the time available, the results are much smaller than perhaps they would have been in more favourable circumstances. When I left Siam towards the end of November, conditions had begun to improve rapidly: it was the time when our visit should have commenced.

I first spent a night at Lopburi to get hares, and arrived at Korat on September 30th, with the intention of travelling eastward down the Nam Mun towards Ubon, but could not get to the river because the intervening country was flooded to a depth greater than the height of the floor of our bullock-carts. We therefore started south-eastwards towards the mountains, where good forest was reported three or four days away, for I hoped we should travel over rising ground in that direction; but on the second day progress was stopped by wide and deep inundations. As the country through which we passed was covered with scrub, bamboo, or open jungle, in which we saw scarcely any signs of mammals or birds, there was no inducement to make a camp: so we returned immediately to Korat. It was impossible not to admire the way in which the Siamese "kwien" (a bullock-cart built without a scrap of metal of any sort) negotiated the floods and the, in many places, appalling tracks through the

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\* Vide *Ibis*, 1918, January, pp. 76-114; April, pp. 189-234.

roadless bush. Outside the wheels of these carts two slightly curved stringers extend from back to front and, where the ruts of the track are too deep for the wheels to touch bottom, the "kwien" is able to proceed for short distances on these runners: they also keep it from tipping over.

From Korat we went back westward about thirty miles to Lat Bua Kao. From the village gently rising forested hills, which I had planned to visit, were visible to the south: but heavy rain, followed by a 25-foot rise of a river between, and the washing away of the only bridge, put an end to hopes in that direction, and we had to be content with working the country to the north of the village. This consisted of scrub and bamboo and a few patches of very poor dense forest which harboured scarcely any vertebrates. After a fortnight, interest in this locality began to diminish and we returned to Bangkok. Wild cattle (probably *Bos banteng*), serow and deer occur near Lat Bua Kao, but none were met with.

Next I went to Sriracha, on the west coast of the Inner Gulf and, hiring a mat-sailed "rua-pet" about 35 feet long, visited the islands to the south (Koh Lan, Koh Kram) as far as Koh Mesan, off Cape Liant, and spent two or three days ashore at the village of Satahip in Shelter Bay, before returning to Bangkok again after ten days' absence. The fauna of the little islands was, of course, very poor, but some interesting races of mammals were obtained.

The next collecting place was the village of Pak Bu, in the rice-fields near the mouth of the Tachin River, or Nam Supan, about twenty miles west of Bangkok; only three or four days were spent in this locality as it was soon exhausted.

The final excursion was a ten days' visit to Koh Lak, situated on the west coast of the Gulf of Siam in about Lat.  $11^{\circ}50' N.$ ; again floods cut us off from the forest and the hills, and confined us to the open country near the shore.

Thus the collections made largely illustrate the more or less open country of Siam, and provide in some ways an interesting contrast to the results of my former visit, which were obtained in the forested country to the south-east (P.Z.S. 1916, pp. 27—75).

The two places where most specimens were obtained were Lat Bua Kao and Koh Lak. The former is in east Siam about thirty miles west of Korat and just within the eastern foot of the hills which separate the slightly elevated, shallow basin of eastern Siam from the central Siam plain and the Menam river-system. My visit was made in October.

Koh Lak, in the Province of Rajaburi (Ratburi) south-western Siam, is on the east coast of the Malay Peninsula, a little south of the latitude of Mergui. The town is now called Prachuap Kirikan; but the other name is so much better known that I have continued to employ it, though it really applied to some small limestone islets lying a few hundred yards from the shore. "Koh" means island, but in this instance all my collections were obtained on the mainland; in all other cases where the word occurs in this paper the specimens recorded are insular. I stayed at Koh Lak in November.

The divisions of Siam which I have used (Central, Eastern, etc.) are as defined in P. Z. S. 1916, p. 64, and Journ. N. H. Soc. Siam, I, p. 250 and map, except that—following Dr. Malcolm Smith, Journ. N. H. S. Siam, II, p. 49—I have now divided the longer continuous strip there called Western and Peninsular Siam into three areas, and call the middle portion South-western Siam. The new division lies between the reduced areas of the other two, and stretches from the Petcharaburi River to the Isthmus of Kra—roughly speaking, between latitudes  $13^{\circ}$  and  $10^{\circ}30'N$ . Western and south-western Siam are therefore coterminous with the Burmese province of Tenasserim; while Peninsular Siam is restricted to the northern part of the Malay Peninsula below the Isthmus of Kra, and has the Malay States to the south of it.

I am indebted to Mr. Oldfield Thomas for the determination of the *Crocodyrus* and the four species of *Microchiroptera* obtained.

There are several printer's errors in the account of the Mammals obtained on my earlier visit (Proceedings of the Zoological Society, 1916, pp. 27-75) which I take this opportunity to correct.

Page	28	line	31.	<i>For</i>	Klun	<i>read</i>	Klum.
"	29	"	"	"	Koh Si	"	Koh Si Chang.
"	32	"	35	"	paler	"	darker.
"	39	"	8	<i>between</i>	on	<i>and</i>	islands <i>insert</i> large
"	"	"	"	<i>for</i>	animals	<i>read</i>	islands.
"	"	"	9	<i>delete</i>	forms		
"	"	"	"	<i>for</i>	those	<i>read</i>	the homes
"	40	"	23	"	Siam	"	Saigon.
"	57	"	34	"	Bonhote	"	(Blyth).
"	59	"	38	"	10.1	"	16.1
"	66	"	4	"	3660	"	2135.
"	70	"	9	"	Mennaw	"	Ménao.
"	71	"	10	"	"	"	"

Pages 66-75. Measurements of rodents (squirrels and rats):—  
*for* Condyllo-basal *read* Condyllo-basilar  
 " Palatal " Palatilar.  
 (as in the present paper).

Regarding the rats of which measurements are given on p. 59 in the Proceedings; of the specimens previously determined by Thomas as *berdmorei*, that from Thagata, Tenasserim, has since become the type of *Rattus berdmorei mullulus* Thomas, while the Manipur, and probably the Bhamo, specimens are now *Rattus manipulus* Thomas (Journ. Bombay Nat. Hist. Soc. XXIV, pp. 412-414).

Kuala Lumpur, Federated Malay States,  
 February 1918.

#### PRIMATES.

##### 1. *Presbytis obscura smithi*.

*Presbytis obscura smithi* Kloss, Journ. Nat. Hist. Soc. Siam, II,  
 p. 5 (1916).

*Presbytis obscura* Gairdner, Journ. Nat. Hist. Soc. Siam, I, p. 116  
 (1914);

2 ♀ ad. Koh Lak.

The pale fore-arms and tail and silvery white hind-limbs, in sharp contrast with the body and feet, render this race of *obscura* by

far the most striking of the forms into which the species has been divided.

The darkest and most concolorous animals occur about the latitudes of Penang and Kedah, and the races become more variegated as they recede from that locality both to the north and southwards; but animals from the latter region do not attain the contrasting colours which are so marked in the present subspecies. The description of the typical form applies perfectly to examples from the extreme south, and Cantor's statement regarding its habitat, "district adjacent to Singapore, Malayan Peninsula" (Journ. Asiat. Soc. Bengal, xv, 1846, p. 174) may be taken as indicating the typical locality.

In colour these two females agree perfectly with the male which is the type of the subspecies,<sup>1</sup> except that in one of them the median area of the upper back is paler: their skulls are smaller and have considerably smaller rostrums.

Mr. K. G. Gairdner has found *P. obscura* (identified *in litt.* as the present race) generally distributed in the province of Petchari, but states that it is not found in Siam north of Lat. 13° 20'.

Gyldenstolpe (Kungl. Sv. Vet. Akad. Handl, 57, No. 2 p. 5. 1916) records *P. o. flavicauda* (Elliot) from Koh Lak and *P. o. halonifer* (Cantor) from Koh Lak Paa (Koh Lak forest), which is within a day's walk of the former place. Apart from the improbability of finding two such geographical races in the same district, *halonifer* is the name given to a local form from Penang Id., and that identification, at least, is not likely to be correct. The present females and the type have been compared with series of both those forms and all three races differ considerably.

*Méasurements*:—See table *postea*.

## 2. *Presbytis argenteus*, nov.

*Presbytis phayrei*, Gairdner, Journ. Nat. Hist. Soc. Siam, 1, p. 252 (1915).

*Types*. Adult male and female (skins and skulls), Nos. 2144

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<sup>1</sup> By an error in the original description the type was stated to be a female.

and 2127/C.B.K. Collected at Lat Bua Kao, East Siam on 8th and 11th October, 1916.

*Characters.* A grey leaf-monkey with dark hands and feet; pelage not grizzled. A whorl of hair on the occiput and an erect crest, forming either an upstanding tuft or a median ridge.

*Colour.* Male:—A row of stiff black hairs above the eyes. Crown and temples somewhat fuscous. Whiskers, shoulders and upper parts nearly neutral-grey slightly washed with wood-brown giving a general colour-effect of silvered mouse-grey. Rump, lower limbs and base of tail silvery, rest of tail deep mouse-grey slightly washed with wood-brown and silvered; front of thighs deep mouse-grey; feet brownish-black. Throat, chest and forelimbs deep mouse-grey, the latter gradually darkening over the forearms to brownish black on the hands. Abdomen and inner side of upper arms slightly paler than chest, the inner sides of the forearms darker but less so than on their outer aspect.

Type female as in the male, but the whiskers and upper surface—especially the occiput, neck and shoulders—paler, more silvery and with the wood-brown wash very distinct on the median line of the upper back, while the undersurface is also paler, being of a yellowish silvery tone. The feet are slightly grizzled.

A slightly younger female (2128), and a juvenile female (2129), are rather deeper mouse-grey than the male, and more washed above with wood-brown than either of the types; in the older of the two the thighs are also washed with wood-brown and the distal half of the tail is tinged beneath with ferruginous. A yet more juvenile male (2130) is darker still, being almost deep quaker-drab and scarcely silvered at all, except on the chest, which is silvery white.

These animals might alternatively perhaps be described as quaker-drab, but their colour is difficult to express as it varies with the incidence of light, and the above descriptions have been drawn up with the specimens placed near a window, heads pointing to the left.

*Measurements.* External measurements of the types taken in

the flesh:—head and body, 575, 498; tail 810, 775; hind-foot, s.u. 178, 159; ear, 37, 34.

Skulls:—greatest length, 103, 95; basal length, 75.5, 70; zygomatic breadth, 78, 71.4; upper tooth-row excluding incisors (alveoli), 33.5, 32. For other measurements see table *postea*.

*Specimens examined.* Two adult males, three adult females and two juveniles all from the type locality.

*Remarks.* This leaf-monkey also occurs in Western Siam from Sisawat (*vide* Gairdner *loc. cit.*) to Raheng, from which neighbourhood I have received a skin collected by Messrs. Elwes and Yates. It is probably Tickell's *S. phayrei* from "east of Moulmein," of which a description and figure are given by Blanford (Faun. Brit. Ind. Mamm., p. 41, fig. 10).

*Presbytis phayrei* (Blyth) of Arakan (of which I have examined the type series in the Indian Museum) is a very different animal, being white or yellowish white below and brown elsewhere, paler and silvery across the shoulders and darker or blackish on the forehead and the extremities of the limbs. Its crest is an erect compressed ridge curling slightly backwards, but the hair of the head shows no sign of radiating.

### 3. *Presbytis cristata koratensis*, subsp. nov.

*Type.* Adult female (skin and skull) No. 2136/C. B. K. Collected at Lat Bua Kao, east Siam on October, 1916.

*Characters.* A silvered greyish leaf-monkey, much lighter in colour than *P. germaini* (M-Edw.) and without the white nuchal band and bluish tinge of *P. margarita* (Elliot).<sup>1</sup>

No crest nor whorl of hair on the head of the type. A fringe of stiff black hairs immediately above the eyes. Anterior hairs of crown curling forwards and downwards; whiskers first directed backwards, then forwards and downwards; the ears completely hidden by them and by the long hairs of the sides of the neck. Hair of crown and occiput growing mostly backwards and

<sup>1</sup> Ann. & Mag. Nat. Hist. (8) IV, p. 271 (1909).

*Pygathrix margarita*, Elliot, Review of the Primates, III, p. 81, pl. 2 (1913).



downwards, the latter slightly lengthened but not forming a pad or cap.

*Colour.* Sides of face, chin and whiskers silvery, the latter slightly tinged with buff. Upper parts deep fuscous-grey (the roots of the hairs deep mouse-grey) much grizzled or frosted by the silvery tips of the hairs, the median line of shoulders and back darkest. Hair of shoulders and sides with neutral grey bases and silvery tips, that on the sides being longer and much paler.

Outer sides of forelimbs less frosted on the upper arm than the shoulders, and gradually darkening over the forearm to clear black on the hands. Hind-limbs like the sides on their outer aspect, the front of the thigh darker; the lower leg very silvery; feet sharply contrasting, black very slightly grizzled.

Throat, lower parts of body and inner sides of limbs buffy-silvery to pale neutral grey.

Tail black throughout and slightly grizzled, the upper surface darkest (when entirely unworn many more of the hairs probably have silvery tips), base of the undersurface buffy-silvery.

There is the usual sex-mark of the female:—a large white crescentic skin patch extending from below the callosities down the inner side of either thigh.

*Skull and teeth.* Agree with those of *P. germaini* except that the ascending ramus of the mandible is narrower.

*Measurements.* External measurements taken in the flesh:—head and body 495; tail, 795; hind-foot, s. u., 152; ear, 37. Skull:—greatest length, 95; basal length, 68; upper tooth row excluding incisors (alveoli), 29; zygomatic breadth, 70.

*Specimens examined.* One, the type.

*Remarks.* Our knowledge of the silvered leaf-monkeys is not complete, and the relationships of the various forms is still somewhat obscure, but the present animal is related to *P. germaini* which is really only a local form of *P. cristata* (Raffles).

I have been able to examine a series of these monkeys from Indo-China and Malaysia: they are *germaini* from S. E. Siam;

*mandibularis*\* from Koh Chang Id., S. E. Siam: *cristata* from Sumatara: *pullata*† from Bintang Id., Rhio Archipelago, *ultima*‡ from Borneo, and finally animals from the Federated Malay States. The latter seem to have a similar skull and exactly the same colour as *ultima* from which, on the series available, they can only be distinguished by the form of crest: this in Bornean animals grows backwards, coming to a point on the occiput, while in Malayan examples it is erect, forming a distinct tuft or ridge. The difference seems to be of no importance as, of two specimens of *mandibularis*, one has an upstanding tuft and the other has the hair on occiput and nape as in *koratensis* but rather more lengthened. The range of the Malayan animal appears to be very limited, as it is only known from the stretch of coast between Penang and Malacca on the west side of the Peninsula.

*P. pullata* was described as being darker than *cristata* and with smaller teeth. I have little doubt, however, that comparison was made with Malayan animals, which were sent home with it, and not with typical Sumatran individuals; for on comparing examples of it with a specimen of the latter, the only difference I can detect is that the general colour-effect of the dorsal pelage is brownish black rather than greyish black as in *cristata*. The following Key illustrates the differences shown by all these races as far as colour is concerned: the species becomes paler as it goes northward:—

A. Blackish, only slightly silvery, base of fur greyish-black.

a. whiskers blackish, only slightly tipped with silvery; throat blackish.

a<sup>1</sup> darker colouring greyish-black *P. c. cristata*.

b<sup>1</sup> darker colouring brownish-black *P. c. pullata*.

b. whiskers pale, nearly silvery throughout; throat pale grey.

\* Kloss, P. Z. S., 1916, p. 32.

† Thomas and Wroughton, Ann. & Mag. Nat. Hist. (8) III, p. 439 (1909).

‡ Elliot, Proc. U. S. Nat. Mus., 38, p. 351 (1910).

- a*<sup>1</sup> thighs very silvery *P. c. germaini*.  
*b*<sup>1</sup> thighs less silvery, blackish *P. c. mandibularis*.  
 B. Very silvery, base of fur neutral-grey:  
 whiskers and throat silvery *P. c. koratensis*.  
 C. Paler than A, darker than B: whiskers inter-  
 mediate between Aa and Ab: throat  
 grizzled. *P. c. ultima*.

(Borneo and Malay States).

4. *Macaca nemestrina indochinensis*, subsp. nov.

*Macaca an lacuensis*, Kloss, P. Z. S. 1916, p. 30; id. Journ. N. H. Soc. Siam, II, p. 2 (1916).

*Type*. Adult male (skin and skull) No. 2148, C.B.K. Collected at Lat Bua Kao, East Siam on 12th October 1916.

*Characters*. Like *Macaca nemestrina ulusta* Miller, of South Tenasserim\* but of duller colour, lacking the russet hue of the latter on back and shoulders, facial ruff less annulated, buttocks and sub-caudal region paler: but with a more distinct dark line down the back.

*Colour*. A whorl of hairs on the vertex. A few stiff black hairs above the eyes; crown blackish brown sharply margined in front and narrowing to a point on the forehead, but fading on the occiput into the colour of the nape: sides of face, temples and whiskers pale greyish buff; anterior parts of the ear-ruffs tipped with blackish brown. Nape, shoulders, outer sides of upper arms and anterior half of back mummy-brown annulated with ochraceous; posterior half of back duller and darker, mummy-brown annulated with buffy; from behind the shoulders an indefinite median line of clove-brown continued to the tail which is blackish brown on the upper surface, entirely so at the tip and pale isabelline below elsewhere. Forearms markedly annulated buff and fuscous; hindlimbs, which are browner, like the rump but the grizzling very faint on the shins. Buttocks and an indistinct tuft on either side of the tail-root buffy white. Fore-digits clove-brown and hindfeet largely so. Ears white hair above and behind them, throat, chest and inner sides of arms greyish white. Abdomen pale brownish grey.

\* Proc. U. S. Nat. Mus. xxix, p. 559, pls. xiii-xvii, (1906).

This male differs from the females whose appearance I have recorded under *M. andamanensis* (l. c. s.) in having the top of the head, median line of back and the extremities darker; limbs greyer throat chest and buttocks whiter; abdomen coarsely but indistinctly annulated; and size much greater.

It is fully adult with the teeth beginning to show signs of wear and is a trifle larger than the type of *M. n. abusta* – the hind foot notably so; it is also, judging by the approximation of the muscular ridges on the parietals (18 mm.) a little older, but the form of the skull and its measurements and characters are in markedly close agreement. In connection with it I have examined a series of pig-tailed macaques (males) from the Malay Peninsula; all those from the Malay States, i.e., the South, are either *Macaca nemestrina* (typical locality, Sumatra) or a slightly modified form; and are characterised by long muzzles, black crowns, and backs so blackened (though the spread of the latter colour is variable) that the black tail forms no contrast. Of two males from Trang, Peninsular Siam, however, one is a typical southern animal in every respect; the other approaches *abusta* in colour as regards the reduction of the black element, though without the bright rufous suffusion; but its muzzle, though shorter than in *nemestrina*, is not modified to the same extent as in Tenasserim animals. Trang may therefore be regarded as the locality where intermediates between the two forms occur.

I have also been able to compare my specimen with a male example of *M. andamanensis* Bartlett. The latter is the type of *M. leonina* Blyth, and was at one time mounted and exhibited, and owing to exposure its colour is now much deteriorated: it is, however, even more annulated than *indochinensis*, and the median line of the back was apparently not darkened or, if so, yet so slightly that annulations are clearly visible<sup>1</sup>: otherwise the general ex-

1. Anderson, however, (Zoological Researches in Yunnan, p. 52), says that "*leoninus*" has a dark median line on the lower half of the back and that above the tail there are no annulations: but these features are not mentioned in his descriptions of Blyth's specimen (Cat. Mammals Indian Mus., I, p. 71), and the later account in the "Researches" is perhaps drawn up from an Irawadi specimen showing gradation towards *M. abusta*.

ternal appearance of both seems very similar. There are the same distinct pale tufts on either side the root of the tail, though the tuft at the end is reddish in *andamanensis*; the hairs of the upper back and shoulders are no longer than in *nemestrina*, *adusta* and *indochinensis*, and the so-called "horseshoe-shaped crest" is similar - this latter appears to have been much exaggerated in descriptions and illustrations. The limbs are apparently shorter but proportionately stouter, and the skull (according to Anderson, for that of the present example is now missing) had the face more vertical and the muzzle much shorter (Zool. Res., p. 53, figs 1 and 2). The main differential characters therefore seem to be:--

1. Muzzle elongated; back much blackened; annulations coarser and less distinct, and the area covered by them not forming such a large proportion of the pelage; limbs longer....*nemestrina*.

2. Muzzle modified and tapering; back only slightly blackened on the median line; annulations finer and markedly present over a large area; limbs as in *nemestrina* (a) shoulders bright russet...*adusta*. (b) shoulders only tinged with dull russet....*indochinensis*.

3. Muzzle much reduced and shortened, resulting in a much more vertical face; median line of back scarcely blackened; pelage much annulated nearly everywhere; limbs apparently stouter and shorter....*andamanensis*.

In spite of the cranial and other differences it is indubitable that all are only subspecies of *nemestrina*.

In previous papers on Siamese mammals I recorded as *M. andamanensis* two females which evidently belong to the present form, one of which came from a locality but a few miles distant from Lat Bua Kao. I did this, however, with some hesitation because of the difficulty in identifying solitary females of these monkeys of which no good account existed, and it was solely because descriptions and measurements (Zool. Res., pp. 53, 55) regarded by Anderson as those of *andamanensis* so closely applied, that my specimens were placed under that name, *adusta* being rejected in faith of Elliot's statement that the females were without

conspicuous annulations on the upper parts and presented a striking contrast to the males (Review of the Primates II, p. 207). As the second of these females came from the extreme south-east of Siam, the range of *indochinensis* may be taken as covering the southern half of that country east of the Chao Phya river.

The teeth of this race are somewhat variable; for instance small extra tubercles are developed on both sides of the upper molars of the female principally at the ends of the transverse channel between the main cusps, but they are only present on the inner sides of  $m^2$  and  $m^3$  in the male. The latter has, however, a large cusp forming a marked heel in both posterior molars, especially large in the lower, and this is entirely lacking in the female.

Dimensions of the adult male:—Collector's external measurements taken in the flesh: head and body, 525 (555)<sup>1</sup>; tail, 250 (230); hind-foot, s.u., 179 (163). Skull:—Greatest length, 138 (136); condylo-basal length 108.5 (-); basal length, 97.5 (-); palatal length, 64 (-); maxillary tooth-row including canine, alveoli, 46.5 (46.8); diameter of upper canine at alveolus 10 (10); diameter of last upper molar, 9.7 x 8.2<sup>2</sup> (9.6 x 9.0); front of orbit to gnathion, 52.8 (53.8); front of orbit to posterior point of skull, 94<sup>3</sup> (89.7); greatest breadth of muzzle above the canines, 31 (-); greatest breadth of rostrum above  $m^3$ , 43 (-); zygomatic breadth 95.2 (94); breadth of braincase above roots of zygomata, 67.2 (64.4); depth of braincase between extremity of frontal and lower edge of condyle, 58.3 (59); length of mandible, 98 (100); mandibular tooth row including canine, alveoli, 51 (53).

##### 5. *Macaca irus*.

*Macacus irus*, F. Cuv. Mem. Mus. Hist. Nat. Paris, IV, p. 120, (1818).

*Macaca irus*, Kloss, P.Z.S. 1916, p. 31.

1♂ juv., 1♀ juv. Lat Bua Kao.

Two, dull-coloured animals with radiating crests.

<sup>1</sup> Measurements in parentheses those of the type of *M. n. lasta* from Champang, S Tenasserim, U. S. N. M. No. 124023.

<sup>2</sup> Crowns.

<sup>3</sup> to posterior point of braincase.

The specific name for the crab-eating monkey of S. E. Asia and the Malay Islands is *Macaca irus* Cuvier (syn. *fascicularis* Raffles, vide Cabrera, Ann. and Mag. Nat. Hist. (8) VI, p. 620). I have not seen sufficient material from Sumatra (typical locality) to show whether the animals of the mainland are subspecifically distinct; a fairly large collection of the latter, however, may be divided roughly as follows:—

1. Of twenty-five examples from the Malay Peninsula north of Lat 9°, Tenasserim, East and South-east Siam, and small islands off the coasts, all are dull-coloured animals having no tone of bright ochraceous in their upper parts.

2. Of forty-five specimens from the Peninsula south of Lat. 8° and neighbouring small islands, the majority (especially regarding the islands) have a decided ochraceous tone on the head and back, sometimes so intense as to be ferruginous: but there are a few which are indistinguishable from northern examples

Such a distinction, however, seems to be of no value; as Blanford states that both dark coloured and golden rufous animals are found in Burma; it is from one of the latter that *M. aureus* Is. Geoffr., is described.

Elliot has given names to a number of macaques recently: *Pithecus capitalis* seems to have been based merely on a very large specimen from Trang, Peninsular Siam, and a topotype can be exactly matched by an example from Singapore, to animals from which island the same author has given the name *Pithecus dollmanni*. *Pithecus validus* "is stated to have come from Cochin China," and *P. vitis* is attached to a specimen from Domel Id, Mergui Archipelago.

#### 6. *Macaca irus atriceps*, subsp. nov.

*Type.* Adult male (skin and skull) No. 2283/C.B.K. Collected on Koh Kram Id. near Cape Liant, S. E. Siam on 30th October 1916.

*Characters.* A very distinct race of *M. irus* Cuv., with much black in the pelage, a black area on the crown and the basal half of the tail blackened above. A slight occipital crest. Bare skin of

face and buttocks brightly coloured.

*Colour.* Upper parts of neck and body, shoulders, outer sides of forelimbs and outer parts of upper thighs a grizzle of black and buff, the annulations becoming finer and the buff paler on the thighs and forelimbs; the nape darkest. Feet and lower part of thighs externally mouse-grey, darkest on the feet, the thighs very faintly annulated with pale buffy. Hairs on all digits pale smoke-grey; the hands dark fuscous, scarcely spotted. Lips and ears, sides of neck and body, entire underparts, inner sides of limbs, buttocks and lower side of tail smoke-grey. Upper side of tail brownish black basally, becoming gradually paler towards the tip where it is fuscous. Crown with a black elliptical area, about  $50 \times 40$  mm., slightly grizzled in the centre. Temples and cheeks buffy grey beset with black hairs. Base of fur on neck and back blackish-brown.

Bare skin of face red-brown, eyelids bluish-pink, abdomen bluish-white, skin about anus plumbeous-blue, scrotum brownish; callosities pale bluish, or yellowish-fleshy.

*Skull and teeth.* This race is distinguished by the large rostrum and mandible and by the great size of the teeth. In males the tooth-rows are only slightly arched and the greatest breadth across them is at  $m^2$ ; in females they are extremely arched and adjacent posteriorly, and the greatest breadth is at  $m^1$ . The type and a second male (2284) have marked sagittal crests.

*Specimens examined.* Four adults and one juvenile male; two adults, one sub-adult and one juvenile female.

*Remarks.* This macaque appears to have some resemblance to *Macaca validus* (Elliot)\* stated to have come from Cochin-China which also has the crown and upper part of tail black at base, but otherwise its colour seems very different, *validus* being a brighter and browner animal with olive tones on the limbs. The skulls seem to be much alike, but the teeth of *atricaps* are larger, though the mandible is much shorter (if the measurements given by Elliot are correct; often they are not).

\* *Pithecius validus* Elliot, Ann. & Mag. Nat. Hist. (8) IV p. 252 (1909).



Measurements of *Macaca irus atriceps*.

No.	...	...	2283 Type.	2284	2285	2282	2288	2286	2287
Sex.	...	...	♂ad.	♂ad.	♂ad.	♂ad.	♀ad.	♀ad.	♀sub ad.
Head and body, measured in flesh	...	...	465	425	460	445	435	410	415
Tail	..	...	550	545	540	515	475	480	475
Hind foot, s.u.	..	...	137	130	132	129	117	115	112
Ear	..	...	46	45	49	49	43	43	43
Skull and teeth:—									
Greatest length	...	...	120	117	116.5	113.5	106	103	99
Basal length	...	...	87	84	85	82	71	71	68.2
Palatal length	...	...	53	—	54	52.5	—	43.5	41
Zygomatic breadth	...	...	80.2	—	77	82	—	69.5	68
Upper tooth row excluding incisors	...	...	42	39.5	42	40.2	36.1	36.1	35
Upper molar series only	...	...	33.1	32.0	34.3	32.7	32	30.6	31
$m^2 - m^2$ externally	...	...	37.1	36.2	37.0	35.7	—	34.4	33.8
Lower tooth row excluding incisors	...	...	46.5	44.6	48.4	44	40.6	—	39
Lower molar series only	...	...	39.8	38	41.1	38	37	—	34
Length of mandible	...	...	86.2	86	88.2	85.3	75	73.3	71

Table of measurements (in millimetres). Measurements of hind feet are always exclusive of claws.

Species and Locality	Sex	Total length	Tail	Hind-foot s. n.	SKULL.				No.	Remarks
					Greatest length	Basal length	Zygomat- ic breadth	Upper molar row (alveoli)		
<i>Presbytis obscura smithi.</i>										
Koh Lak, S. W. Siam ...	♀	1230	700	162	90	64	69	24	2408	Adult.
" " " " " " " "	♀	1184	700	164	94	67	69.6	25	2435	"
Klong Bang Lai, Pathu- S. W. Siam	♂	1345	783	167	100	73	78	27.5	2028	" Type.
<i>Presbytis argenteus</i>										
Lat Bua Kao, E. Siam	♂	1436	878	172	113	79	83.5	27.3	2461	Pronounced sagittal crest.
" " " " " " " "	♀	1385	810	178	103	75.5	78	26.5	2444	Adult Co-type.
" " " " " " " "	♀	1273	775	159	95	70	71.4	26.5	2127	" Co-type*
" " " " " " " "	♀	1260	750	159	98	68	72	27.2	2128	"
" " " " " " " "	♀	1272	781	157	96	69	70	32.2*	2462	"
<i>Presbytis corbata koratensis</i> *										
Lat Bua Kao, E. Siam	♀	1285	795	152	95	67.6	70	24	2136	" Type.

\* including canines.

One male (2285) is rather more warmly coloured than the rest of the series, the yellow in the upper pelage being ochraceous-buff and the speckling of the fore-limbs correspondingly brighter, but otherwise it agrees.

I did not obtain any monkeys on the coast adjacent to Koh Kram so it is impossible to say yet whether this is an insular race or has a greater range: animals from Korat and Chantabun do not resemble it. It is a striking looking macaque on account of its black cap and bright skin colours, the face being such a red-brown that the collector who first saw it reported that *M. rufescens*, with which he was acquainted, was in the neighbourhood. The skin colours of the females differ slightly from those of the males, in that the teats are bluish-pink, the skin surrounding both anus and callosities is plum-coloured and the callosities are dull pale yellow and bluish mixed.

The slight up-standing occipital crest is sometimes rather irregular and twisted: it is generally produced by the radiation of the hair from two closely adjacent points.

#### CARNIVORA.

##### 7. *Felis bengalensis*.

*Felis bengalensis*, Kerr, Animal Kingdom, p. 151 (1792); Flower, P. Z. S. 1900, p. 325; Gyldenstolpe, Arkiv. för Zoologi, 8, No. 23, p. 25 (1914); Kloss, Journ. N. H. Soc. Siam, III, p. 51 (1918).

*Felis tenasserimensis*, Gray, P. Z. S., 1867, p. 400.

1 ♀ adult, Koh Lak.

A very dull-coloured specimen: general colour above dull, slightly greyish buff, rather brighter on limbs and sides, the head, neck and median line of back tinged with ochraceous-tawny. The black spots on the sides are generally situated at the posterior end of indistinct ochraceous-tawny patches which sometimes connect two or three spots together; spots on the limbs rounder and very small at the extremities; two large elongate ochraceous-tawny areas on the shoulders nearly surrounded by black. Upper surface of tail like the back with dark brown spots, a few narrow bands at the tip. Markings on head, neck and ears normal.

Below white with bold blackish markings; underside of tail slightly buffy, markings obsolete. Lower sides of forefeet pale buffy grey, of hindfeet dark brown; inner sides of hindfeet whitish.

Measurements:—head and body, 500; tail, 290; hindfoot-111, ear, 45. Skull:—greatest length, 88; greatest breadth, 58; upper sectorial, length 10, breadth 4.8; length of lower molar row (alveoli) 20.

8. *Viverricula malaccensis thai*, subsp. nov.

*Type*. Aged female (skin and skull) No. 2449/C.B.K. Collected at Prapatom, Central Siam on 20th November, 1916.

*Diagnosis*. Size and markings as in *V. m. malaccensis* (Gm.), with seven dark rings on the tail, but the buffy ground colour slightly paler and duller and with more numerous black-tipped hairs; tail more nearly white.

Skull and teeth as in *malaccensis* with long and deep bullae which, however, only converge slightly so that the anterior part of the basioccipital is but little narrowed, while the ridges in front of the bullae are small; in this respect resembling the smaller *V. m. rasse* (Horsf.) of Java though the bullae are not flattened.

*Specimens examined*:—Two females both from the type locality.

*Remarks*. Mr. Bonhote in his revision of the genus *Viverricula*\* states that *malaccensis* is very variable in colour and markings, but the remark is of a general nature and applies to animals found throughout India and the Malay Peninsula. I have compared the Siamese examples with topotypes from the Malay States and the colour differences noted, though slight, seem constant. *V. m. thai* is most nearly allied to *V. m. malaccensis* from which it differs in only two other respects—the slight convergence of the bullae, which is a feature of *V. m. rasse*, and rather narrower skull.

*Hyaena striata*?

Reports that I have received seem to indicate the presence of a hyaena in Siam, and if it really occurs its existence there is

\* Ann. & Mag. Nat. Hist. (7) 1, pp. 119-122 (1898).

† Muang thai = Land of the free = Siam.

Measurements of *Viverricula malaccensis*.—

Number	<i>V. malaccensis thai</i>		<i>V. malaccensis malaccensis</i>	
	2448/ CBK	2449/ CBK	107/14/ FMS	109/14/ FMS
		Type		
Sex ... ..	♀ ad.	♀ aged.	♀ ad.	♂ ad.
Head and body ... ..	530	544	553	520
Tail ... ..	355	335	331	345
Hindfoot, s. u. ... ..	97	92	94	93
<i>Skull.</i>				
Greatest length ... ..	98.5	96.5	97	96
Condyllo-basal length ... ..	94	94	96.1	94.4
Basal length ... ..	91	90	92	89
Palatal length ... ..	46	47.5	48	46
Upper toothrow, excluding } incisors (alveoli) }	35	35.4	35.2	35
Last three upper cheek teeth } (alveoli) }	14	13.2	14	13.1
Greatest diameter of upper sectorial	10.1	9.1	9.9	9.9
Breadth of palate between inner } roots of sectorials }	14.1	13.2	13.5	14
Least interorbital breadth ...	12.9	12.2	13.9	14
Breadth across postorbital processes	19.7	20.6	21.1	22
Zygomatic breadth ... ..	46	46	47	47.4
Cranial breadth ... ..	31	30	31.8	31.3
Greatest breadth across bullae ...	31	30.6	30	30.2
Greatest length across bullae ...	22	22.5	22.8	21.8
Least breadth between bullae } anteriorly }	8.7	8.3	7.3	6.9
Least breadth between bullae at } condyloid foramina }	13	12	13	12.3

most interesting, as it is at present unknown east of the Bay of Bengal. Mr. A. J. Irwin, Adviser to the Royal Siamese Survey Department, told me that he has twice seen large blunt-headed, dark and light grey beasts (one of which had crushed the limb-bones of a dead ox); once at Bangplasoi, about 30 miles east of the Chao Phya river mouth, and again somewhat north of Kanburi; while Mr. J. J. McBeth of Bangkok has also given me a similar description of an animal met by him. The characters noted fit *H. striata* very well, and no other dog-like animal in Siam has the bone-breaking powers mentioned by Mr. Irwin. But an earlier record of the occurrence of a hyaena in still more eastern longitudes is that by Mr. J. McCarthy in "Surveying and Exploration in Siam." Writing of his journey from Wien Chan (Vien Tiane) to Chieng Kwang (Xieng Khouang) now in French Laos, he says (p. 40) "One morning I saw a striped hyaena standing under a tree. The camp pariah dog gave chase but I called him back. On nearing the jungle the wily hyaena stopped and turned round, seeming very much disappointed and looking longingly after the dog. As usual, my gun was nowhere".

### 9. *Canis aureus*, subsp.

*Thos aureus cruesmanni*, Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl., 57, No. 2, p. 23 (1917).

A juvenile example from Wang Pong, Pran, S. W. Siam, is so young (greatest length of skull 127 mm.), that it conveys no correct idea of the adult animal. Neither Gyldenstolpe nor I succeeded in obtaining the jackal at Koh Lak where it is well known, so the present example is the most southerly on record outside India and Ceylon.\*

*Canis aureus cruesmanni* (Matschie, S. B. Ges. Naturf. Freunde Berlin, 1900, p. 144) is based on some young animals living in the Berlin Zoo which were captured at Nong Bua about 30 miles west of Korat. Matschie's description is that of the animals when about a year old. When about half that age or less they

\*[Jackals are said to be common near the sea shore not far north of Chumpon Eds.].

were pale brown on head and legs the bodies were speckled, tails blackish and lips whitish. Broadly speaking the present specimen agrees; the hinder parts are somewhat grizzled and there is a broad blackish line along the back from the shoulders.

The jackal is well known to the Siamese who call it *ma ching chawk*, i.e., dog which makes a noise like a gecko (*ching-chawk*).

#### 10. *Cyon javanicus*.

*Canis javanicus*, Desm., p. 198 (1820).

*Canis familiaris* var *sumatrensis*, Hardwicke, Trans. Linn. Soc. XIII, p. 231, pl. XXIII (1822).

*Canis rutilans*, S. Mull. in Temminck's Verhandelingen. Zool. Zoogd., pp. 27, 51 (1839-44).

*Cuon rutilans*, Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl., 57, No. 2 p. 23 (1917).

Whilst walking in some long grass along the edge of a patch of jungle at Lat Bua Kao, I almost stepped on a wild dog. It darted into the bush instantly but I was able to note the rich ferruginous colour and bushy black tail. Siamese name, *ma pa*.

#### INSECTIVORA.

#### 11. *Crocidura fuliginosa*.

*Sorex fuliginosus*, Blyth Journ. Asiatic Soc. Bengal XXIV, p. 362 (1855).

1 ♀ in spirit, Lat Bua Kao.

External measurements: head and body, 117; tail, 43; hind foot, 13.

#### 12. *Tupaia glis belangeri*.

*Cl* [*adobates*] *belangeri*, Wagner, Schreb. Säugeth. Supp. II, p. 42, (1841).

*Tupaia pygmaeus*, Lessou, Nouv. Tabl. Reg. Anim. Mamm., p. 93 (1842).

*Tupaia glis belangeri*, Kloss Journ. N. H. Siam. III, p. 53 (1919).  
6 ♂ 7 ♀ ad. and subad. Koh Lak, S. W. Siam.

1 ♀ subad. Pran River mouth, S. W. Siam.

1 ♂ ad. Hua Hin, Pran, S. W. Siam.

1 ♀ ad., 1 ♀ imm. Satahip, S. E. Siam.

4 ♂ ad., 1 ♀ imm., 1 ♂ ad. Lat Bua Kao, E. Siam.

The discovery in the extreme south of Tenasserim of *T. clarissa* Thomas, (Journ. Bombay N. H. Soc. XXV, 1917, p. 200) which was described as a full species, seems to me to supply evidence of complete gradation between the southern brightly-coloured, long-snouted tupaia with 4 mammae ("*ferruginea*" forms), and the northern dull, short-snouted animals with 6 mammae ("*belangeri*" forms) and to make it now necessary to regard all of them as merely subspecies of one species, *T. glis* (Diard) of Penang, rather than to establish the specific distinctness of other animals than *glis* (cf. antea p. 54). The animals listed above must, I think, be regarded as examples of *belangeri*. I have seen no skins of topotypes, but two skulls of adults from Lower Pegu and South Arakan have rostral lengths (tip of premaxillaries to lachrymal notch) of 19.8 and 19 mm., and in this respect the present series, in which the rostrums so measured range between 18 and 20 mm., agrees with them.

All are dull-coloured animals with a well-marked neck-stripe and, though two or three are darker throughout than the rest, in none of them is the rump washed with ochraceous; or if it is the colour is hardly appreciable, and generally occurs on the shoulders also. Mammæ 3 — 3 = 6:

They cannot be referred to *chinensis* Anderson, from Yunnan, near Bhamo, also a dull-coloured animal, as in it the neck-stripe is practically obsolete,<sup>1</sup> while from an intermediate locality (Nan, North Siam) Thomas has described a form, *batum*<sup>2</sup> and also on either side of *chinensis* has defined other races, *siccata*<sup>2</sup> from the Lower Chindwin, Burma, and *gambalis*<sup>2</sup> from Mongtze, S. E. Yunnan, all being quite different in colour. My specimens from S. W. Siam (which do not seem to differ from the others) doubtless represent *leaster* recently described by Thomas from the Great Tenasserim River in the same latitudes,<sup>3</sup> but that name seems antedated by

<sup>1</sup> The north-eastern tupaia (*chinensis*, *gambalis*, *modesta*, *concolor*, etc.) all seem to differ from the western and southern races in the absence, or great reduction, of the neck-stripe.

<sup>2</sup> Ann. & Mag. Nat. Hist. (8) X111 p. 243-4 (1914).

<sup>3</sup> Journ. Bombay Nat. Hist. Soc. XXV, p. 201 (Sept. 1917).



*siamensis* Gyldenstolpe,<sup>1</sup> based on a single semi-adult specimen from Koh Lak. It is stated to be most nearly related to *T. minor malaccana* Anderson, while the skull resembles that of *T. javanica* Horsf., but is narrower. The former is unknown north of the Malay States, and *javanica* has never yet been correctly recorded from continental Asia; and though it is possible, as in the case with several other species, that it occurs in Java and again in Indo-China but is absent from the greater part of the Malay Peninsula (c.f. *Bandicota*, *Helictis*, etc.), yet, since a good deal of thorough collecting has been done in the area now being dealt with, it is curious that no animal of the kind indicated has been obtained previously — if it exists. Tupaias are quite conspicuous and not at all shy.

Gyldenstolpe also obtained at the same place examples which he calls *belangeri* (tom. cit., p. 18) and it is probable that in separating *siamensis* he was misled by the immature characters of the skull in his type specimen.

For measurements see table *postea*.

### 13. *Tupaia glis cambodiana* subsp. nov.

*Tupaia concolor*, Kloss, P. Z. S. 1916, p. 37.

This is the animal previously referred by me, for geographical reasons, to *T. concolor* Bonhote, though I noted at the time that it was not typical; further examination leads me to regard it as distinct. Though it closely agrees with *T. concolor* in size, the mammary formula for that form is believed to be 2 — 2=4, in this it is 3 — 3=6

*T. concolor* further (*vide* Bonhote, P. Z. S. 1907, p. 7) is uniform grizzled greyish-green above and the neck-stripe is so faint that unless special search is made it is liable to be overlooked; Lyon also (Proc. U. S. Nat. Mus. 45. p. 68) does not mention any neck-stripe at all and states that the upper parts are grizzled ochraceous-buff and blackish, anteriorly more buffy, posteriorly more ochraceous, but not conspicuously so, while the tail is similar to

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<sup>1</sup> Kungl. Sv. Vet. Akad. Handl., 57, No. 2 p. 20 (Feb. 1917).

adjacent parts of the body with five light and five blackish bands; in *cambodiuna*, including the extreme base and tip of the hairs, there are only four of each, and the tail is more like the shoulders than the rump which is often suffused with ochraceous. The neck stripes are apparently more distinct than in *concolor*, but less so than in *belangeri*.

Compared with the latter it is larger and darker, the annulations anteriorly being of a deeper buff and not producing such an olivaceous effect while the rump is often more richly coloured and the rostrum is longer.

*Measurements and specimens examined.* See P. Z. S. 1916, pp. 36, 68.

*Type.* Aged female (skin and skull) No. 1841 C. B. K. Collected at Klong Yai, S. E. Siam on 6th January 1915.

#### 14. *Tupaia glis olivacea*, subsp. nov.

*Type.* Adult male (skin and skull) No. 2208 C. B. K. Collected at Pak Bu near Tachin, Central Siam, on 23rd October, 1916.

*Diagnosis.* Colour above a grizzle of blackish and buff, producing a speckled olive effect. Neck-stripes and under-parts pale olive-buff. Tail above more coarsely annulated than the back, black more in excess and buff paler; below greyer than above, no distinct median stripe. Size rather larger than *T. g. belangeri*. Mammary 3—3=6.

*Measurements:* See table *postea*.

*Specimens examined.*:—Four from the type locality.

*Remarks.* Two of the specimens are more buffy below than the type and another (2207).

This is an extremely distinct animal on account of its dark greenish colouring. I can only account for it, surrounded as it is by very different coloured forms, as the result of complete isolation by the Chao Phya and Tachin rivers in a swampy area, where differential characters once evolved have become dominant since they have not been modified and brought back to the normal by contact with animals of which the greater part live under more normal conditions. It is probably for some such reason

as this that races inhabiting small islands are often more different from the general form than those occupying large areas; in a small population a divergence from the normal, once started, has a better chance of succeeding and modifying the whole than it would in a large population; in the latter also, more divergences than one may arise which may modify each other and bring the population back more to the normal once again.

#### CHIROPTERA.

##### 15. *Pteropus vampyrus malaccensis*.

*Pteropus vampyrus malaccensis*, K. Andersen, Ann. & Mag. Nat. Hist. (8) ii, p. 368 (1908); id. Cat. Chir. Brit. Mus., I, p. 346 (1912); id. P. Z. S. 1916, p. 39.

*Pteropus vampyrus intermedius*, Kloss, Journ. Nat. Hist. Soc. Siam, II, p. 11 (1916) [Krabin, Central Siam].

1 ♂, 2 ♀, Koh Mesan off Cape Liant, S. E. Siam.

23 examples, Koh Pra Noi near Satahip, S. E. Siam.

All these are undoubtedly *malaccensis*. I was, therefore, apparently wrong in thinking that the examples of this race which I obtained in S. E. Siam were there as the result of migration across the Gulf of Siam from the Malay States; and with the present material in hand I find that the specimen from Krabin determined as *P. v. intermedius* is a sub-adult *malaccensis*. It would appear more probable, therefore, that *malaccensis* ranges throughout the Malay Peninsula to South Tenasserim and thence across Southern Siam to Cambodia.

Having been lent by the Indian Museum the specimens to which the earlier references apply, I have gone into the synonymy given by Andersen in the "Catalogue" for *P. intermedius* which suggests that it occurs southward to Peninsular Siam; I find that *Pteropus javanicus* Blyth (Tenasserim) and *Pteropus medius* Blyth (S. Tenasserim) are respectively *P. hypomelanus geminorum* Miller, and a sub-adult example of *malaccensis*.\* *Pteropus medius*? Miller, was a young adult placed with hesitation under that name and my own reference is to the same animal. All the remaining

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\* "*Pteropus edulis*" obtained by Dr. J. Andersen near Mergui (Journ. Linn. Soc. XXI (1889) p. 337.) also proves on examination to be a typical example of *P. v. malaccensis*.

references are merely citations of the unique type specimen. Andersen is now inclined to regard *intermedius* as only a subspecies of *vampyrus* (P. Z. S. 1916, p. 40) and if this is right we cannot expect to find it in areas occupied by *malaccensis*; so it looks as though the type locality of *intermedius* (Amherst, near Moulmein) is near the southern extremity of its range, which may stretch northwards through Burma towards Assam where *P. leucocephalus* Hodgs. occurs.

(For measurements see table *postea*.)

### 16. *Pteropus lylei*.

*Pteropus lylei*, Andersen, Ann & Mag. Nat. Hist. (8), 11, p. 367 (1908); id. Cat. Chir. Brit. Mus. 1, p. 339 (1912).

*Pteropus medius*, Flower, P. Z. S. 1900, p. 339.

1 ♂ ad. Bangkok. June 1916 (Dr. Malcolm Smith coll.).  
No. 2471.

1 ♀ ad. 1 ♂ imm. Bangkok. October 1916. (Mr. E. J. Webb coll.). Nos. 2450-1.

These examples illustrate the variation recorded by Andersen in the "Catalogue". The two adults have the breast and the belly blackish, becoming bone-brown on the sides and slightly grizzled throughout; the back blackish grizzled with silvery; and the head as far as the ears about auburn, becoming black on the cheeks and throat. Dr. Smith's specimen has the mantle buffy, the anterior sides of neck and a median area on the foreneck tinged with Sudan brown. Mr. Webb's female has the mantle and neck Sudan brown suffused with auburn brown in front. The immature male has the back as in the adults, the head Sudan brown blending with a buffy mantle and the sides and front of the neck suffused with amber brown; the throat is black; the hairs of breast and belly are blackish at base with ochraceous tips, the ventral area alone being dark brown; this young animal (skull, 58.5; forearm, 138 mm) resembles specimens of *P. giganteus* (Brumm.).

*Pteropus lylei* does not appear to develop a sagittal crest. The two larger specimens are quite adult with the teeth worn and the basioccipital suture completely obliterated, but the ridges on the cranium are 4 - 5 mm apart.

This species is apparently the common flying-fox of Bangkok, whence no other has been recorded. It has been taken at Petchaburi to the south-west and extends eastward to Saigon.

(For measurements see table *postea*.)

### 17. *Cynopterus angulatus*.

*Cynopterus angulatus*, Miller, Proc. Nat. Acad. Sci. Philadelphia, 1898, p. 316.

*Cynopterus brachyotis angulatus*, Andersen, Cat. Chir. Brit. Mus. 1, p. 611 (1912); id. P.Z.S. 1916. p. 40; Wroughton, Journ. Bombay Nat. Hist. Soc. XXIII, p. 702 (1915).

3♂ ad., 5♀ ad., 1♀ subad. Bangkok, Oct. 1916.

None of the animals in this series exhibit a sagittal crest but all seem adult except the last.

Leaving the ears out of the question—measurements of which may be rendered inaccurate either through the personal equation of the worker or through distortion in preservation—these specimens are evidently not *sphinx*, judging by the ratio of rostrum to length of skull, as in that species the length of the rostrum (orbit to nares) is more than one-fourth the total length (*vide* Andersen, *op. cit.* p. 612).

I record them therefore as *C. angulatus*, though the ears are large while the other dimensions show that they are equal in size to smaller examples of *sphinx* (see below). The measurements of three adults collected by Mr. G. C. Shortridge at Tenasserim Town and Bankachon, Tenasserim, are also given.

		Siam.	Tenasserim
Skull, lambda to gnathion	...	31.5—32.7	31.0—31.3
„ condylo-basal length	...	30.4—31.1	30.0—30.2
„ rostrum	...	7.6— 8.0	7.1— 7.2
Mandible	...	24.8—26.0	23.3—25.9
<i>C</i> — <i>M</i> 1, crowns	...	10.1—11.0	10.0—10.7
Forearm	...	65.0—69.0	71.0—76.0
3rd digit, metacarpal	...	44.0—45.7	44.7—49.0
„ phalanx	...	28.0—31.8	30.0—31.0
Ear from orifice	...	18.0—20.0	20.0—21.5
Tibia	...	26.0—27.0	26.5—28.2

18. *Miniopterus blepotis*.

*Vespertilio blepotis*, Temm., Mon. Mamm. II, p. 174 (1835).

2 ♂ ad, Koh Lak.

External measurements:—total length, 121, 118; hindfoot, 10. 2, 10. 5; ear, 12. 6, 12. 8; fore-arm 50, 49; tibia, 20, 21 mm.

19. *Miniopterus medius*.

*Miniopterus medius*, Thomas & Wroughton, P. Z. S. 1909, p.382.

2♂, 5♀. Koh Lak.

External measurements, minimum and maximum of the series:—head and body, 44-52; tail, 47-51; hindfoot, 8-9; ear, 9.4-11. 8; forearm, 40.4-42.0; tibia 16.3-18.0 mm.

20. *Myotis muricola*.

1♂ ad. Bangkok. September 1916.

External measurements:—head and body, 45; tail, 39; hind-foot, 6.2; ear 12.8; forearm, 34; tibia, 14. 5 mm.

21. *Hipposideros larvatus*.

*Rhinolophus larvatus* Horsf., Zool. Res.in Java (1824).

1♀ ad. Koh Lak.

External measurements:—head and body, 71; tail, 30; hind-foot, 9.5; ear, 22.5; forearm, 61; tibia, 22 mm.

## RODENTIA.

22. *Sciurus caniceps caniceps*.

*Sciurus caniceps*, Gray, Ann. & Mag., X, p. 236 (1842); Kloss, Journ. Nat. Hist. Soc. Siam, II, pp. 18, 83 (1916); Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl., 57, No. 2, p. 33 (1917).

*Sciurus chrysonotus*, Blyth, Journ. Asiat. Soc. Bengal, XVI, p. 873, pl. 37, fig. 1 (1847).

*Sciurus epomophorus fluminalis*, Robinson and Wroughton, Journ. Fed. Malay States Mus. IV, p. 233 (1911).

1 ♂ ad, 1 ♀ imm. Lat Bua Kao.

These examples are in the bright winter pelage, having the upper side of the body rich Mars yellow, this colour extending over the crown of the head and down the base of the tail: they are the most easterly specimens on record. *S. v. fluminalis*, of Northern Siam is apparently only this animal in dull summer pelage. The

race does not seem to occur in S. W. Siam where it is replaced by *S. e. davisoni* Bonh. and the following form.

(For measurements see table *postea*.)

### 23. *Sciurus caniceps inexpectatus*.

*Sciurus epomophorus inexpectatus*, Kloss, Journ. Nat. Hist. Soc. Siam, II, p. 178 (1916).

*Sciurus epomophorus davisoni*, Gyldenstople. Kungl Sv. Vet. Akad. Handl., 57. No. 2, p. 35 (1917).

5 ♀ ad. Koh Lak.

Most nearly resembling *S. e. milleri* Robinson & Woughton from Trang, Peninsular Siam, but paler throughout.

Occiput, back and sides a grizzle of maize-yellow and black, blending into a grizzle of white and grey (silvery) on the face and limbs but the yellow brightening on the sides of the neck. Ears slightly tinged with yellowish, their backs grey to silvery. Underparts, an indistinct grizzle of white and grey with a scarcely perceptible darker median line. Axillae and groin dull buff-yellow, these areas sometimes joined by an indistinct wash of the same colour along the line of contact between side and belly. Tail like back but the grizzle coarser and tending to form bands distally, the last 50-70 mm. pure black sharp'y margined from the grizzled part.

A specimen taken in June at the same place\* only differs in having the axillary and inguinal regions brighter, the latter being ochraceous-orange, and the lower median line of the tail ochraceous-buff. Seasonal variation, therefore, does not affect the general colour of the upper parts as in true *caniceps*.

It is curious to find these squirrels most resembling *milleri* of Trang, for I have a series from Chumporn, an intermediate locality, which are *S. e. davisoni* (type locality Bankachon, South Tenasserim), a race of much darker colour than either.

*Type.* Adult female (skin and skull) No. 2434/C.B.K. Collected at Koh Lak, S. W. Siam on 15th November 1916,

(For measurements see table *postea*.)

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\* Obtained by Messrs. Williamson and Smith's collectors.

24. *Sciurus atrodorsalis pranis*.

*Sciurus erythraeus pranis*, Kloss, Journ. Nat. Hist. Soc. Siam, II, p. 178 (1916).

*Sciurus atrodorsalis*, Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl., 57, No. 2, p. 35 (1917).

5♂ ad., 2♂ subad.; 6♀ ad., 1♀ subad. 2♀ juv. Koh Lak.

In the original diagnosis I referred these squirrels to *rubeculus* Lyon (regarded as a form of *erythraeus*) because in size and colour of upper parts some of them exactly resembled a specimen from Bok Pyin, South Tenasserim, from which I considered them distinct on account of their paler underparts and paler albescence-tipped tails. The type of *rubeculus* came from Trang, Peninsular Siam, and with it were associated four specimens from South Tenasserim, one of which is the above-mentioned Bok Pyin example.

Further examination shows however, that the Bok Pyin animal (and doubtless the others from the neighbourhood) is not typical; for on comparing it with a series from Tung Song and Kao Nong in the state of Nakon Sri Tamarat (the first place about 30 miles and the latter 80 miles from the typical locality, while S. Tenasserim is about 180 miles away) it proves to be less richly coloured above, while it is also intermediate in size between the smallest example of *rubeculus* and the largest of *pranis*. Northern animals, even the darkest, are much less richly coloured than the Southern ones, both above and below, and are also smaller. I think, therefore, that *pranis* is a well-differentiated form of *atrodorsalis* with which it agrees in size; there is frequently a slight blackening of the posterior back which also indicates a connection; this is quite absent in *rubeculus*.

*Characters.* Smaller than *rubeculus*; paler above and without the Mars-yellow suffusion on the nape and body; below, the grizzled areas much paler and the coloured parts ochraceous though sometimes washed with rufous; in *rubeculus*, however pale the coloured areas may be, there is always present a tone of mahogany-red.

Size about as in typical *atrodorsalis*, but with the median



dorsal area only occasionally slightly blackened by black-tipped hairs; head suffused with rich ochraceous, underparts yellow ochre to buff (at the most only partially tinged with burnt sienna) and divided mesially by a grizzled line,

*Colour.* Upperparts varying from a grizzle of buff and black to one of ochraceous and black slightly darkened on mid-back and the rump in the majority of the series; muzzle, top of head and ears varying from Mars yellow to orange buff less speckled with black than the back, the brighter heads going with the brighter bodies; the backs of the ears paler greyish yellow, ungrizzled. Hands and feet rather darker than the limbs, as dark as the back where blackened.

Underparts:—chin, throat and neck varying from yellow scarcely grizzled to a fine grizzle of buff and grey; a grizzled median line of varying breadth of the same colour as the sides of the body; the areas between the grizzled parts buff to yellow ochre, these colours extending less distinctly along the under sides of the limbs. In about 30 per cent the yellow area is suffused with burnt sienna, least on the chest, strongest on the axillary region and the thighs.

Tail varying from buff to ochraceous-orange annulated with black, the latter forming distinct bands distally except on the last inch or so where the hairs have long buffy or albescent tips; whiskers black.

Those specimens which have more richly coloured underparts are also, on the whole, more richly coloured throughout.

*Remarks.* This is obviously a variable squirrel, though not, I think, a race of true individual variation, but rather one in which each animal goes through a cycle of change: as this change, however, does not seem to take place at a time common to all, it cannot be considered seasonal. The absence of any such occurrence is shown by three examples taken in June\*: one of them is indistinguishable from examples of the November series and the others only differ in having the heads duller (yellow ochre).

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\* Coll. Messrs. W. J. F. Williamson and M. A. Smith.

Two young animals are as brightly coloured above as the adults but are much less speckled with black, below they are yellowish slightly tinged with burnt sienna except for the neck and median line.

*Type.* Adult male (skin and skull) No. 2395/C.B.K. Collected at Koh Lak, S. W. Siam on 9th November, 1916.

(For measurements see table *postea*.)

### 25. *Sciurus atrodorsalis tachin*.

Kloss, Journ Nat. Hist. Soc. Siam. ii, p. 178 (1916.)

9♂ ad. 6♀ ad. 1♀ imm. Pak Bu, Tachin, Central Siam.

A form of *Sciurus atrodorsalis* Gray, remarkable for small size and rare development of a black dorsal patch.

Above a grizzle of black and yellow, the latter ranging from antimony yellow to cream, but the general colour effect very variable owing to the very variable amount of black speckling. Muzzle rather brighter than the back and less blackened; limbs grey and duller.

In rather less than half the series there is a slight darkening of mid-back and rump, owing to the presence of more distinctly black-tipped hairs, and in one specimen this darkening takes the form of an elongate black patch, though only the tips of the hairs are blackened,

Ears generally tawny, sometimes a tawny ring round the eye and the muzzle tinged with the same colour; backs of ears buffy-grey. Hands and feet generally, though not always, darker than the limbs.

Chin, throat and chest a grizzle of buff and grey which extends backwards as a median line broadest on the chest; rest of underside of body with limbs varying from burnt sienna throughout, or zinc orange, or bright yellow-ochre suffused with ferruginous on the thighs. In three or four examples the yellow is much reduced and very faint.

Tail usually black and faint buff forming bands distally, most distinct towards the tip which is generally albescent. In the immature animal the annulations are obscured by a wash of

orange-buff not extending to the tip. The black-backed specimen, which is the type, has this suffusion to a less degree.

When first obtained the small size of this squirrel obscured its relationship, but towards the end of my visit the black-backed specimen was collected and this development appears to indicate an undoubted affinity with *atrodorsalis*. In colour the race more nearly resembles the large *S. a. zimmeensis* (Rob. & Wr.) of North Siam<sup>1</sup> and *S. a. shanicus* Ryley, of the Shan States,<sup>2</sup> than the geographically nearer typical form of Moulmein or *S. a. thaimi* mihi, from Raheng.<sup>3</sup>

Two specimens collected in May by Dr. Malcolm Smith do not differ from examples taken in November.

*Type.* Adult female (skin and skull). No. 2213; C. B. K. Collected at Pak Bu, Tachin, Central Siam on 23rd October, 1916.

(For measurements see table *postea*)

## 26. *Sciurus nox*.

*Sciurus nox*, Wroughton, Ann. & Mag. Nat. Hist. (8) II, p. 396 (1908); Kloss, Journ. Nat. Hist. Soc. Siam, I, p. 227 (1915); id., op. cit., II, p. 17 (1916).

13♂ ad. 3♀ ad. Satahip, near Cape Liant.

The types of this species came from Sriracha on the east coast of the Inner Gulf of Siam about 30 miles S. E. of the Chao Phya river mouth, and it remained unknown elsewhere until I received specimens from Hup Bon and Nong Khor, a few miles inland. It would thus appear to have a very small range and to be practically confined to a triangular piece of country of which Cape Liant is the apex.

It is a very stable animal, always entirely black, and shows no tendency to intergrade with any other form. Its nearest relation seems to be *S. albivexilli* mihi, from Koh Kut, Chantabun Archipelago, which only differs in the possession of a white tail-tip, rather shorter tail and hind foot and slightly larger skull.

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1. Journ. Fed. Malay States Museums, VII, p. 91 (1916).
  2. Journ. Bombay Nat. Hist. Soc. XXII, p. 663 (1913)
  3. Journ. Nat. Hist. Soc. Siam, II, p. 285 (1917).

*S. ferrugineus cinnamomeus* Temm., has been taken in company with it at Hup Bon, but I did not meet with it at Satahip.

(For measurements see table *postea*.)

### 27. *Sciurus finlaysoni tachardi*.

*Sciurus finlaysoni*, Kloss, Journ. Nat. Hist. Soc. Siam, I, p. 157 (1915); id. op. cit. II, p. 16 (1916).

*Sciurus finlaysoni finlaysoni*, Kloss, op. cit. I, p. 225 (1915); id. op. cit. II, pp. 13, 179 (1916); p. 345 (1917).

*Callosciurus finlaysoni tachardi*, Robinson, Journ. Fed. Malay States Mus. VII, p. 36 (1916); Thomas, Journ. Nat. Hist. Soc. Siam. II p. 343 (1917).

7♂ ad. 7♀ ad. Lat Bua Kao.

This is a somewhat variable form. The general colour on the upper parts of the head and body is buffy-white to buffy with grey bases to the hairs. Usually the buff is so much in excess that the animals appear to be of that colour, and the grey bases of the hairs are hardly visible unless the fur is disturbed: but in some examples the grey has so spread up the hairs that the effect is almost that of a grey-backed animal much washed with buff. Examples having the latter appearance, with which age and sex have nothing to do, may indicate an approximation to *S. nox* (though grey-based hair is common to many squirrels), and since the two have not been found side by side, *nox* may be nothing more than a very distinct geographical race of *finlaysoni*.

Though *S. f. cinnamomeus* Temm., occurs towards Northern Siam and at Chantabun together with the white squirrel,\* I did not meet with it at Lat Bua Kao where the present form was the common squirrel.

Messrs H. C. Robinson and Oldfield Thomas have recently had some discussion with me as to the type locality of *Sciurus finlaysoni finlaysoni*; I having held (following Anderson) that it came from the mainland, they that it was taken on Koh Si Chang in the Gulf of Siam: and though I do not consider that their arguments have fully proved their contention I am now able to settle the point in their favour. In his "Embassy to Siam and Cochin China"

\* *vide* Wroughton, Ann. and Mag. Nat. Hist. (8) pp. 394, 397 (1908).

Crawford writes of the Si Chang Islands, "The only quadrupeds which we observed on these islands, were a large species of rat, and a small squirrel about a foot long. This last was numerous in the forest, and we obtained several specimens. It was of a milk-white colour, the paws excepted, which were black. "(2nd Ed. Vol. I, pp. 296, 7 (1830), and in a footnote states, "This appears to be a new species, and Dr Horsfield has appropriately named it after the late Mr. Finlayson."

(For measurements see table *postea*.)

### 28. *Sciurus finlaysoni trotteri*.

Kloss, Journ. Nat. Hist. Soc. Siam, II, p. 178 (1916).

10♂ ad, 2♂ imm., 11♀ ad, 1♀ imm. Koh Lan, Inner Gulf of Siam.

Like *S. f. folletti* mihi,<sup>1</sup> but darker: tail not banded and underparts without any distinct rufous areas.

Upper parts:—hairs at base neutral grey on the back, paler on the head and side; the distal halves dirty yellowish white (pale olive buff) the extreme tips black. The middle back is generally blacker owing to local reduction of the pale annulations, but this dark area is very variable in extent and in two or three animals is practically absent. The limbs and sides of the head and neck are grey slightly tinged with brown and finely and faintly grizzled with whitish; hands and feet blackish slightly grizzled; ears like the head, their backs grey bordered with whitish.

Below a variable sullied grey largely grizzled, but axillary and inguinal regions and the undersides of the thighs whitish. The median line is slightly darkened and the underparts are faintly margined from the sides.

Tail cream-colour generally grizzled with black at the base, the central hairs of the pencil black. Some of the hairs between base and tip have faintly blackened ends and the median line of the underside is nearly always somewhat blackened – in many specimens markedly so.

In a few animals there are indications that rufous areas may occur down the median line of the chest and abdomen and at the

<sup>1</sup> Journ. Nat. Hist. Soc. Siam. I. p 159 (1915)

axillary region, but none of the series possess the rufous patches seen in some examples of *S. f. folletti*; as compared with that race the dark element is much increased and the colour effect is much less of a pale olive buff.

Young animals resemble adults but have the grizzle of the upper parts much finer and the pale colour reduced in quantity.

There appears to be no seasonal variation in these squirrels. The type series of *folletti* was taken in February, and I have lately been sent a set obtained in July by Mr. W. J. F. Williamson's collector; there is no difference between two lots; in both the great majority are without rufous colouration and in both two or three individuals exhibit rather irregular patches of rufous (principally inguinal and axillary) on the underparts.

*Type* Adult male (skin and skull) No 2266 C. B. K. Collected on Koh Lan, Inner Gulf of Siam on 29th October, 1916.

(For measurements see table *postea*.)

Named after Mr. E. W. Trotter, Major-General of Gendarmerie, Siam, who was the first to collect specimens of this Koh Lan squirrel.

**29. *Tamiops maccllelandi liantis*, subsp. nov.**

*Type*. Adult female (skin and skull) No. 2337/C. B. K. Collected at Satahip near Cape Liant, S. E. Siam on 2nd November 1916.

*Characters*. A race nearest *T. m. rodolphi* (M-Edw.), from which it differs in having the outer pale stripes continued without interruption or diminution over the shoulders; in the Cochin-China animal these stripes instead of being continuous from muzzle to rump are either broken on the shoulders or very much reduced there.

*Colour*. Forelimbs and sides greyish strongly suffused with buff, the hairs with grey bases and buffy tips. Four yellow stripes on the back; the outer pair pale cream extending from the base of the tail to the muzzle passing below the ear and eye but above the vibrissae where they are duller in colour: the inner pair, commencing indistinctly at the shoulder and extending to the base of the tail, ochraceous-buff anteriorly, warm buff on the rump. On the

body the outer yellow stripes are bordered externally by a line of blackish-ochraceous; the crown and nape are deep ochraceous-tawny speckled with blackish as are the areas between the pale stripes on the anterior half of the back but on the posterior part of the back these areas become black stripes, the outer dark pair being slightly speckled with ochraceous.

Chin whitish, throat and undersurface of body and limbs ochraceous-orange washed with deep ochraceous-salmon on the abdomen. Hands and feet, ears and top of muzzle warm buff; back of ears black, the hairs near the base anteriorly and at the tip white, those on the posterior half black with white extremities and elongated. Tail annulated black and ochraceous-buff, the tips of the hairs white; extremity of tail black.

*Skull and teeth.* Do not differ materially from those of *T. m. rodolphi*.

*Specimens examined.* The type, and an example from Krabin about eighty miles east of Bangkok.

*Measurements.* Collector's external measurements:—head and body, 118; tail, 117; hindfoot, s. u., 27.5; ear, 13.5. Skull:—greatest length, 32; condylo-basilar length, 25.5; palatilar length, 12; diastema, 6.0; upper molar row (alveoli), 6.1; median nasal length, 7.6; least interorbital breadth, 12; zygomatic breadth, 19.5; greatest breadth of combined nasals, 3.9 (5.5 in the example from Krabin)

*Remarks.* The specimen from Krabin, about 100 miles to the north of Cape Liant and taken on the same day of the previous year, (vide *T. rodolphi*, Journ. Nat. Hist. Soc. Siam, II (1916) p. 21) differs in having the head, neck and shoulders paler (i. e. ochraceous-buffy), and the inner yellow stripes also paler, while the dark stripes are all grizzled though the median one is blackest: the sides and hind-limbs are also greyer and buffy; there is, however, a considerable variation of this kind in a series of *T. m. rodolphi* topotypes, in which paler inner stripes are also correlated with paler shoulders, sides and limbs.

Both *T. m. rodolphi* and *liantis* differ from *T. m. novemlineatus* of Peninsular Siam and *kongensis* of North Siam, in having

much broader and more grizzled dark stripes which do not extend so far anteriorly.

### 30. *Menetes berdmorei*.

With 52 specimens available it appears possible to recognise the following continental races in Siam:—

#### a. *MENETES BERDMOREI BERDMOREI*.

*Sciurus berdmorei*, Blyth, Journ. Asiat. Soc. Bengal, XVIII, p. 603 (1849)

*Menetes berdmorei berdmorei*, Thomas, Journ. Bombay N. H. Soc. XXIII, p. 23 (1914); Kloss, Journ. N. H. Soc. Siam, II, p. 23 (1916)

Dark dorsal stripes present but not conspicuous; undersurface strongly buffy.

Specimens examined:—Four from Martaban and Mergui, Tenasserim (ex coll. Indian Museum); two from Klong Bang Lai, Patiyu<sup>1</sup> S. W. Siam (January); three from Hua Hin, Pran<sup>1</sup> S. W. Siam, (June).

For measurements see Kloss, *loc. cit.*, and table *postea*.

The specimens from Tenasserim and Patiyu have the characters given above; the Pran examples, which were taken at midsummer, are very different. They are extremely pale and dull-coloured animals with the sides of the head and the extremities of the limbs greyish; there are no dark dorsal stripes and the areas between the yellow lateral stripes, which are pale, are of the same colour as the back; the under-parts are pure white. Hua Hin is in the same latitude as Mergui and only a hundred miles north of Klong Bang Lai and it seems at present premature to regard these examples as distinct.

Distribution:—Rangoon, (Burma) to Patiyu, S. W. Siam; (typical locality, Moulmein).

#### b. *MENETES BERDMOREI MOUHOLI*.

*Sciurus mouhohi* Gray, P. Z. S. 1861, p. 137

*Menetes berdmorei mouhohi*, Thomas, Journ. Bombay N. H. S. XXIII, p. 23 (1914); Kloss, P. Z. S. 1916, p. 48; id. Journ. N. H. S. Siam, II, p. 84 (1916).

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1. Messrs W. J. F. Williamson and M. A. Smith's collectors.



Dark dorsal stripes less conspicuous than in *berdmorei*; underparts white tinged with yellow.

Specimens examined:—Seventeen from S. E. Siam (Chantabun town to the Cambodian boundary on coast).

For measurements see Kloss, *loc. cit.*

My specimens, though not topotypes, doubtless more nearly represent the typical animal taken by Mouhot in "Cambodia" than any others since recorded. One of them has the underparts as strongly buffy as winter examples of *berdmorei*.

Distribution:—S. E. Siam and Cambodia.

c. *MENETES BERDMOREI KORATENSIS.*

*Menetes berdmorei*, Gyldenstolpe (partim), Arkiv. för Zoologi, 8, No. 32, p. 15 (1916).

*Menetes berdmorei berdmorei*, Kloss (partim), Journ. N. H. Soc. Siam. II. p. 23 (1914).

*Menetes berdmorei koratensis*, Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl., 57, No. 2. p. 39 (1917)

Dark dorsal stripe generally more conspicuous than in *mouhoti* and *berdmorei*; underparts white, less tinged with yellow than in *mouhoti*.

Specimens examined:—One from Krabin,<sup>1</sup> Central Siam; two from Hup Bon,<sup>1</sup> and three from Satahip, S. E. Siam; four from Lat Bua Kao, E. Siam.

For measurements see Gyldenstolpe and Kloss, *loc. cit.* and table *postea*.

This race is based on two specimens taken at Sakerat, south of Korat town, and not far from Lat Bua Kao; the characters assigned are small hind-foot and short muzzle (Hf, 36; greatest length of skull, 46.1 mm.); underparts pure white anteriorly, slightly yellowish posteriorly; no dark median dorsal stripe and the areas between the buffy side stripes of the same colour as the upper parts.

The description applies fairly well to my immature juvenile examples and the measurements given suggest that the author had immature specimens before him.

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<sup>1</sup> Messrs. W. J. F. Williamson and M. A. Smith's collectors.

My three adults from Eastern Siam vary considerably; in one the median and lateral dorsal lines are very pronounced and the area between the buffy stripes is black: in another the median dark line is absent and the lateral lines much reduced while the area between the buff stripes is much grizzled and scarcely darker than the upper parts: the third is intermediate.

Of the young animals, one is without any indication of black stripes on the back and the inter-buff lateral area is concolorous with the upper surface: in the other the back is slightly darkened above the buff stripes, and the areas between them are slightly darkened also. The under-parts are yellowish-white in the adults: white, slightly tinged with yellowish posteriorly, in the younger animals.

The Krabin, Hup Bon and Satahip specimens closely resemble the E. Siam adults (of which those from Lat Bua Kao are practically topotypes) except one adult from Satahip which agrees with the young Lat Bua Kao examples, in being without dark stripes: the Satahip juvenile, on the contrary, is heavily striped like E. Siam adults.

The race was compared with *consularis* from which it differs considerably: it is, however, nearest *mouhoti* from which it is not very strongly separated.

Distribution:—Eastern Siam south to the western parts of S. E. Siam (typical locality south of Korat town).

d. *MENETES BERDMOREI CONSULARIS.*

*Funambulus bermorei*, Bonhote, P. Z. S. 1900, p. 56.

*Menetes bermorei consularis*, Thomas, Journ. Bombay N. H. Soc. XXIII, p. 24 (1914); Kloss, Journ. N. H. Soc. Siam, II, p. 86 (1916); Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl. 57, No. 2, p. 38 (1917).

No dark dorsal stripes; underparts pure white, the bases of the hairs sometimes grey and the genital region and the inner sides of the thighs sometimes suffused with buff.

Specimens examined:—Two from Muang Prae,<sup>1</sup> N. Siam, and three from Raheng,<sup>2</sup> W. Siam.

<sup>1</sup> Messrs W. J. F. Williamson and M. A. Smith's collectors.

<sup>2</sup> Coll. Mr. K. G. Gairdner.

For measurements see Thomas, Kloss and Gyldenstolpe, *loc. cit.*, and table *postea*.

Mr. Thomas' statement that the underparts are yellowish white is not confirmed by the specimens examined by Bonhote, Gyldenstolpe and myself, which were obtained between February and June.

Distribution:—The northern parts of Siam (typical locality, Nan).

e. *MENETES BERDMOREI PENINSULARIS.*

*Menetes berdmorei*, Robinson and Kloss, Journ. Federated Malay States Museums, V. p. 121 (1914).

Dark dorsal stripes very conspicuous; underparts white washed with orange-buff, strongest posteriorly.

Specimens examined:—Thirteen from Ban Kok Klap, Nakon Sritamarat, Peninsular Siam.

For measurements see Robinson & Kloss, *loc. cit.* and table *postea*.

This race differs from *berdmorei* in the much more pronounced black dorsal stripes and lighter dorsal region which is often of a colour between Xanthine orange and amber brown, while the underparts are white, but washed with a more intense yellow than the buffy undersurface of *berdmorei*,

Type:—Adult male (skin and skull) F. M. S. Mus. No. 109/13. Collected at Ban Kok Klap, Nakon Sritamarat, Peninsular Siam, on 3rd July by H. C. Robinson and E. Seimund.

The definition of this race is to be attributed to Mr. H. C. Robinson and myself.

**31. *Rattus sabanus herberti.***

*Epinomys vociferans herberti*, Kloss, Journ. Nat. Hist. Soc. Siam, II, p. 25 (1919).

1♂ ad. Lat Bua Kao.

This race differs from the typical animals of Peninsular Siam in being duller above with the white of the undersurface extending on to the muzzle and up the cheeks towards the eyes. The present specimen, which is practically a topotype, is darker above than the original animal with much more black in the composition of the pelage.

(For measurements see table *postea*).

32. *Rattus rajah surifer*.

*Mus surifer*, Miller, Proc. Biol. Soc. Washington XIII, p. 148, pl. IV, figs 4, 4a, 4b (1900).

*Epimys surifer*, Woughton, Journ. Bombay Nat. Hist. Soc. XXIII, p. 714 (1915).

*Epimys surifer surifer*, Kloss, Journ. Nat. Hist. Soc. Siam, II, p. 26 (1915)

1 ad. Koh Lak.

This example (with others from Maprit in Patiyu, and specimens I have seen from Bangkaehon, S. Tenasserim) is scarcely typical, being a trifle less brilliantly coloured than the race from Peninsular Siam (thus showing a slight approach to *R. s. finis* and *R. s. siarma*), but is best ranked with the original continental form.

(For measurements see table *postea*).

33. *Rattus rajah finis*.

*Epimys surifer finis*, Kloss, P. Z. S., 1916, p. 51; id. Journ. Nat. Hist. Soc. Siam, II, p. 85 (1916).

3♂ ad., 5♀ ad., 1♂ imm. Satahip, S. E. Siam.

A series of fine adult animals, the majority showing well-worn teeth: No. 2387 being the largest specimen of *R. rajah* I have seen. The skulls are apparently rather broader than in *R. r. surifer* of Peninsular Siam, and the tooth-rows are parallel, or even diverge a trifle posteriorly, instead of converging.

(For measurements see table *postea*).

34. *Rattus rajah koratis*, subsp. nov.

*Specimens examined*. 6♂ ad., 8♀ ad., Lat Bua Kao.

*Diagnosis*. Darker and duller than *R. r. finis*, more heavily blackened above and the yellow element less brightly ochraceous; white of underparts extending up the sides of the muzzle and to the hindfeet, the wrists and forearms often white above.

Skull not essentially differing from *R. r. finis*: the upper tooth-rows parallel.

*Type*. Adult male (skin and skull) No. 2187/CBK. Collected at Lat Bua Kao, E. Siam on 18th October 1916.

*Measurements*. See table *postea*.

*Remarks.* The characters noted seem common to all the examples obtained at Lat Bua Kao, so that animals from this locality may be regarded as representing a distinct local race. Specimens from the range of hills which separate the Central Siam plain from the Korat basin, which I have recorded as *finis*<sup>1</sup> are somewhat variable, and this locality seems to be part of the region where one form merges into the other.

### 35. *Rattus rajah kramis*, subsp. nov.

*Specimens examined.* 4♂ ad., 3♀ ad., 1♂ subad. and 2 juvenile examples from Koh Kram in the Inner Gulf of Siam.

*Diagnosis.* Rather smaller than neighbouring races of *R. rajah*. Paler and yellower than *R. r. finis* with the black element disposed somewhat patchily; white of underparts extending to fore and hind-feet.

Upper tooth-rows always longer than the palatal foramina and slightly converging posteriorly; supra-orbital ridges more deflected than in *finis* of the adjacent mainland and with more markedly angular projections at the terminations of the fronto-parietal sutures; palatal foramina smaller.

*Type.* Adult male (skin and skull) No. 2277/C B K. Collected on Koh Kram, Inner Gulf of Siam on 30th October 1916.

*Measurements.* See table *postea*.

### 36. *Rattus rattus neglectus*.

*Mus neglectus*, Jentink, Notes Leyden Museum, II, p. 14 (1880). (Borneo).

*Mus rattus*, Flower, P. Z. S. 1900, p. 361.

*Epimys rattus*, subsp., Kloss, P. Z. S., 1916, p. 55; id. Journ. Nat. Hist. Soc. Siam, II, p. 26 (1916); id. *tom. cit.*, p. 85.

*Rattus rattus jalorensis*, Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl. 57. No. 2, p. 43 (1917).

5♂, 3♀ Tachin.

1♂, 1♀ Koh Lak.

Colour above varying from pale ochraceous or bright tawny slightly streaked with black to tawny much blackened; below white,

<sup>1</sup> *Epimys surifer finis*, Journ. Nat. Hist. Soc. Siam, II, p. 26 (1916).

sometimes tinged with grey on the sides and middle line; feet white: a considerably brighter coloured series than that I previously obtained in S. E. Siam. Mammae 3 - 2 = 10.

There is a noticeable amount of individual variation, but I can see no constant differences amongst the rats of this kind from the southern parts of Siam, the Malay Peninsula, Sumatra and Borneo; and it seems most adviseable therefore to regard all as *R. v. neglectus*. There are, however, marked tendencies for animals from the west and north of Siam to be yellower and brighter than those from the south and east, which are browner and duller and more nearly agree with *neglectus* (*jalorensis* Bonhote, of the Malay Peninsula); while the former (*Rattus rattus thai* mihi, with 3 - 3 = 12 mammae) approximate to *sladeni* Anderson, from the neighbourhood of Bhamo, which also has 3 - 3 = 12 mammae but smaller bullae. *Sladeni* is possibly very close to *robustus* Blyth, from Schweygin, which also has small bullae.

My series was taken near the shores of the Inner Gulf of Siam from Islands in which (Koh Si Chang and Koh Phai) I have described the races *R. v. portus* and *R. v. poenitentiarum*<sup>2</sup>; both are consistently yellower and paler than the adjacent mainland animal, the underparts slightly more tinged with yellowish and the feet whiter; the former island race is larger and the latter of about the same size as the mainland animal but with larger teeth and palatal foramina.

(For measurements see table *postea*.)

### 37. *Rattus rattus lanensis*, sub-sp. n. v.

*Specimens examined*:—1♂, 4♀ ad. and subad., 7 imm. and juv. examples from Koh Lan, Inner Gulf of Siam.

*Diagnosis*. Colour consistent, about the same above as in the lighter, yellower individuals of the mainland, but white of underparts slightly tinged with yellow. Size and skull about the same but teeth larger and palatal foramina extending further backwards. Duller and darker than *R. v. poenitentiarum* mihi.

<sup>1</sup> Journ. N. H. Soc. Siam, 11, p. 286 (1917).

<sup>2</sup> op. cit., I, pp. 221, 2 (1915).

*Type.* Adult female (skin and skull) No. 2261/CBK. Collected on Koh Lan, Inner Gulf of Siam on 29th October, 1916.

*Measurements.* See table *postea*.

**38. *Rattus rattus kramensis*, subsp. nov.**

*Specimens examined.* 3♂ ad., 2♀ ad. Koh Kram, Inner Gulf of Siam.

*Diagnosis.* Colour consistent above and a shade deeper than in *R. r. lucensis*, but without any faint yellow tinge below; underparts tinged with pale grey at the sides, feet slightly yellowish. Skull very similar to the mainland form but the zygomata and infraorbital plate averaging a little wider; scutes of tail coarser.

*Type.* Adult female (skin and skull) No. 2281/CBK. Collected on Koh Kram, Inner Gulf of Siam on 30th October, 1916.

*Measurements*:—See table *postea*.

**39. *Rattus rattus mesanis*, sub sp. nov.**

*Specimens examined*:—11♂ ad., 11♀ ad., 5 imm. and juv. individuals from Koh Mesan, near Cape Liant, S. E. Siam.

*Diagnosis.* Colour practically consistent above and as in medium animals from the mainland; below white, sometimes slightly grey at the sides; feet very white. About the same size as *R. r. portus mihi*, but the supraorbital ridges more pronounced and angular, nasals a little smaller, palatal foramina larger and the tooth-rows hardly diverging posteriorly. About the same size also as *R. r. mtkensis mihi*, (P. Z. S., 1916, p. 55), from the Chantabun Archipelago, but skull narrower and palatal foramina smaller, bullae larger, parietal ridges more parallel, colour rather less darkened above mesially, the undersurface, if silvered, much less so and the metapodials without dark centres.

*Type*:—Adult male (skin and skull) No. 2320/CBK. Collected on Koh Mesan Island near Cape Liant, S. E. Siam on 2nd November, 1916.

*Measurements.* See table *postea*.

**40. *Rattus rattus koratensis*, subsp. nov.**

*Specimens examined*:—1♀ ad., 1♀ imm. from Lat Bua Kao, East Siam.

*Characters*:—A general colour resemblance to the “rattus” rats of the southern parts of Siam but the skull relatively broader and the bullae much smaller. Mammæ 3-3=12, as in *R. v. thui mihi*, from Central Siam, but the skull broader throughout and the bullae smaller while the colour of the upper parts is darker.

*Colour*. Above mingled bright ochraceous-tawny and blackish, the sides greyer: below white. Feet white, the metapodials slightly darkened mesially. Tail brown.

*Skull and teeth*. Like those of *R. v. neglectus* of Siam but the skull markedly broader in all respects—palate, zygomata, basi-occipital, etc.; nasals broader, flatter, more spatulate anteriorly; bullae considerably smaller and less dilated; palatal foramina large. As compared with *R. v. thui* there is less difference in the size of bullae but the skull characters and the colour distinguish it.

*Measurements*. See table *postea*.

*Remarks*. The external colour differences are hardly sufficient to separate this race from the local *neglectus* rat and I might have regarded the number of mammæ as abnormal, but the skull is so different in its greater relative breadths, shape of nasals and diminutive bullae, that there is no doubt of its distinctness.

The immature female is dark brown above and dark grey on the sides, only slightly speckled,

*Type*. Adult female (skin and skull) No. 2196 C. B. K. Collected at Lat Bua Kao, East Siam on 19th October 1916.

#### 41. *Rattus concolor*

*Mus concolor*, Blyth, Journ. Asiat. Soc. Bengal, XXVIII, p. 295 (1859).

*Epimys concolor*, Kloss, P.Z.S. 1916, p. 57.

*Rattus concolor*, Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl. 57, No. 2, p. 45, (1917); Kloss, Journ. N. H. Soc. Siam, III, p. 62 (1918).

6 adult and 2 immature examples from Koh Lan.

Evidently a common house animal for the village children, seeing that I wanted rats, brought this species in large numbers in a very short time: the majority, however, were young examples taken from the nest.

I have examined Blyth's original series (*vide* Records Ind.



Mus. XIII, p. 7) but it is of so unsatisfactory a nature that it would be unwise to make any remarks about examples from other localities before good topotypes have been obtained. Gyldenstolpe states that specimens from Koh Lak are absolutely similar to true *Rattus concolor* from the Malay Peninsula, but the latter are not necessarily typical and a specimen from Tioman Island, Pahang, doubtless derived from the mainland or Singapore, has been named *pullus* by Miller.

The measurements of my largest specimen are (No. 2235, ♂):—Head and body, 123; tail, 155; hindfoot, s.u., 25; ear, 16. Skull:—greatest length, 31; condylo-basilar length, 27; diastema, 8; upper molar row (alveoli), 5.4; length of palatal foramina, 5.9; median length of nasals, 11; combined breadth of nasals 3.3; zygomatic breadth, 15 mm.

I take this opportunity to make a few remarks about Gyldenstolpe's recently described form *Rattus sakaratensis* from Eastern Siam (*tom. cit.*, p. 46, pl. VI, figs 6 and 9) erroneously said to be related to *R. concolor* with which, and with *R. concolor ephippium*, it has been compared. It is obviously a member of the "jerdoni" group and if nothing nearer was available should have been referred to *whiteheadi* of which the author possessed examples from Borneo and from the Malay Peninsula ("*asper*" Miller). The figures of the skull agree exactly with skulls of these Malaysian animals but there are differences as regards the pelage. Amongst these the tail is said to be "blackish brown throughout and clothed with short hairs"; the only species of "jerdoni" rat known to me with the former character is *cremoriventer*; that is, however, a much larger animal with a longer, narrower skull and the tail is much longer than the head and body and almost penceillate; the spines are extremely numerous and strong while in *sakaratensis* they are few and feeble; though the skull and dimensions are those of *whiteheadi* (*asper*) the colour is rather that of *cremoriventer*.

42. *Bandicota siamensis*, nov.

*Type.* Adult male (skin and skull) No. 2218/CBK. Collected at Tachin, Central Siam on 23rd Oct., 1916.

*Characters.* Pelage apparently resembling that of *B. mordax*. Thomas, from Chiengmai, N. Siam,\* but skull broader with longer nasals; toothrow shorter and *m*<sup>1</sup> narrower.

*Colour.* Top of muzzle, occiput, orbital region and shoulders brownish-black, the under-fur being mouse grey to clove-brown; from shoulders to rump the under-fur—neutral grey at base, hair-brown at tip—is overlaid by long glistening brownish-black piles which attain a length of 60-70 mm, on the rump. Fur of sides of head and body with neutral-grey bases and mouse-grey tips, thickly beset with (1) longer blackish hairs, and (2) longer buffy-white hairs with faintly indicated black tips; the latter sort occurring to a much less degree on the dorsal region. Upper sides of fore and hind limbs blackish-brown with a few whitish hairs bordering the claws.

Throat and lower cheeks nearly light neutral-grey, the general colour effect of the remainder of the underparts mouse-grey slightly silvered by the whitish tips of many of the hairs.

Tail dark brown, coarsely haired, with eight rings of scales to the centimetre at mid-length.

*Skull and teeth.* The measurements of the skull show that it is somewhat broader than the type of *B. mordax* and has longer nasals. The teeth are smaller than in the latter where their large size, especially in breadth, is the main character on which the species is erected.

As compared with the skull of an adult female of *B. setifera* (Horsf.) from Indramaju, Java, which is slightly smaller, the infra-orbital plate and the posterior root of the zygoma are narrower and the zygomatic space is larger; the palatal foramina are more narrowed posteriorly and the bullae are noticeably smaller; the nasals are larger; the teeth are not so broad and the upper rows exhibit greater convergence anteriorly.

\* Journ. Bombay Nat. Hist. Soc., XXIV, p. 42 (1916).

*Measurements.* External measurements taken in the flesh:—

		<i>siamensis</i>	<i>mordax</i>	<i>setifera</i>
Head and body ...	...	279	228	230*
Tail ...	...	246	230	195*
Hind foot, s.u. ...	...	55	52	53*
Ear ...	...	31	31	30*
Skull:—				
Greatest length ...	...	60	—	59
Condyllo-basilar length ...	...	55	55.3	54
Basilar length ...	...	51.9	—	50.2
Palatilar length ...	...	30.9	30.0	29.9
Length of palatal foramina ...	...	11	11	11
Diastema ...	...	18.3	—	17.7
Nasals ...	...	22.9 x 7.0	21.0 x 6.8	20.9 x 6.0
Interorbital breadth ...	...	8.0	7.4	8.7
Breadth between ridges on parietals ...	...	13.0	12.4	11.0
Zygomatic breadth ...	...	32	30	—
Upper tooth row, crowns ...	...	9.0	10.8	9.2
„ „ „ alveoli ...	...	11.5	—	11.1
Breadth of $m^1$ ...	...	3.4	3.8	3.6

*Specimens examined.* One, the type.

*Remarks.* This animal seems to be closely allied to *B. setifera* and *B. mordax*. In addition to cranial and dental differences it seems to be rather larger than either, and darker in colour than *setifera*, while its undersurface is mouse-grey against the “slaty-grey” of *mordax*.

The specimen was trapped in the rice fields (where it lived in burrows) surrounding the village of Pak Bu near Tachin.

#### 43. *Cannomys minor*.

*Rhizomys minor*, Gray, Ann. & Mag. Nat. Hist. X, p. 226 (1842); Bonhote, P. Z.S. 1900, p. 195; Gyldenstolpe, Arkiv för Zoologi. 8, No 23, p. 19 (1914).

*Cannomys minor*, Thomas, Ann. & Mag. Nat. Hist. (8) XVI, p. 316,7 (1915).

\* from spirit specimen.

*Cannomys minor linnbergi*, Gyldenstolpe, Kungl. Sv. Vet. Akad. Haudl., 57, No 2, p. 47 (1917).

2♀ ad. Lat Bua Kao, E. Siam. Nos 2149, 2150.

3 ad., lat. 14° 37', long. 98° 30' Western Siam. Nos. 2533-5

[Mr. A. J. Irwin] (Skins and skeletons.)

1♂ subadult. North of Lakon Lampang, N. Siam. No. 2467.

[Mr. P. A. R. Barron.]

1 skin without skull, Me Chang, Lakon Lampang. No. 2468.

[Mr. K. G. Gairdner] (hind foot in dried skin, 28.5: tail, 55.)

No 2467 is younger than the others with the parietal ridges 9-10 mm. apart; in the rest the greatest distance between these is 4 mm. at most (in No. 2535, the oldest): in none have the ridges joined to form a sagittal crest as in the obviously very aged example of *badius* figured by Anderson<sup>1</sup>.

The East Siam animals differ from the others in the following respects:—the fronto-parietal ridges are much more distinct, especially on the frontals, and are not pinched together posteriorly; the sutures about the nasals, both median and lateral, are much more open (in No. 2533 they are nearly obliterated mesially) and the occiput makes a more acute angle with the floor of the skull. These slight differences do not seem sufficient to separate the specimens into races, especially as we do not know how they stand towards topotypes.

Thomas examined some half dozen examples of the little Siamese bamboo-rat (including the type of *minor*), in connection with series of the other species or races from Burma, etc.,<sup>2</sup> and professed himself unable to come to any satisfactory conclusion about the former, and for the present we all seem to be in the same position. He notes that all *Cannomys* (red bamboo-rats) "are of similar proportions and all, with one exception (*plumbescens* of the North Shan States) have the coat washed terminally with some shade of rufous which may be brighter in some and deeper in others, but the difference is never beyond the range of individual variation.

<sup>1</sup> Anat. & Zool. Res. pl. XVI. figs. 4, 5, 6.

<sup>2</sup> Op. cit. pp. 313-7 (1915)

Northern specimens [of *minor*] from Chiengmai and Nan can hardly be distinguished from *C. badius* but they vary considerably among themselves." As no two forms of *Cannomys* seem to occur together it is possible that all are only geographical races of one species.

I have not got Gray's original description of *minor* but Horsfield<sup>1</sup> speaks of the type as "uniformly brown with a slight deep chestnut reflection" though Anderson<sup>2</sup> says of it and of a Cambodian (?) specimen in the British Museum obtained by Mouhot "dark sooty-brown, slightly tinged with deep umber which is most distinct on the sides of the head and neck and in reflected lights, but is least marked in the Cambodians specimen. The under parts are like the upper only the brown is almost absent.": his coloured plate (XV) agrees with this.

My seven examples, however, which, appear to belong to one form only, though obtained over a fairly wide area, by their colour much more resemble descriptions of the animal accepted as *badius*, also describe and figured by Anderson<sup>3</sup>, but their skulls resemble the skull from Cambodia ( ? *lege* Petchaburi, W. Siam<sup>4</sup> ) figured by him as *minor*,<sup>5</sup> and I think it best, therefore, to record all by that name.

Gyldenstolpe bases the name *C. m. lonnbergi* on two specimens from Eastern Siam collected near the locality whence came my two animals; they are notably smaller than the latter—considerably smaller in fact than any example of *Cannomys* yet recorded—and their colour is described as generally "slaty grey with a longitudinal white band down the crown. From the chin down the throat a narrow white line" They were originally recorded as *minor* and it was then said of them that they "seem to be full grown" and later the specimen chosen as the type of *lonnbergi* was said to be adult: One of my series, the sub-adult male from

1 Cat. Mamm. Mus. East Indian Co., p 165 (1851)

2 Op. cit. p. 328

3 Op. cit. p. 329, pl. XIV.

4 The only specimen in the British Museum obtained by Mouhot is said by Thomas to have this provenance, and is probably that referred to by Anderson as stated to have come from Cambodia.

5 Op. cit., pl. XVI, figs 7, 8, 9.

Lakon Lampang (No 2467) has a white stripe from muzzle to occiput and has rather less brown than other, and more adult, examples.

If one may venture an opinion regarding material one has not examined, I think that Gyldenstolpe's animals may only be immature individuals of the form represented by my Lat Bua Kao specimens; otherwise we have the discovery of two distinct species of *Cannomys* occurring together, whereas the other forms at present known, which each occupy a separate area, seem to me to be only geographical races of *minor* or *hadius*—both date from 1842, and I do not know which name is the older.

We are not yet in a position to safely propose new Siamese races of *Cannomys*, for the type (collected by Finlayson) is "immature and much deteriorated" (Thomas), and apparently lacks a skull. Recent workers do not seem to have been cognisant of its exact provenance but it came according to its collector's journal,\* from Bamvasor—a place name unknown in Siam in that form. Mr. A. J. Irwin, Adviser to the Royal Siamese Survey Department, informs me, however, that this is undoubtedly a corruption of Bangplasoï, sometimes called Bamplasoï, a district situated in the corner of the Inner Gulf of Siam less than 30 miles east of the Chao Phya river mouth. Finlayson's specimen may well have come thence to Bangkok or Koh Si Chang, places visited by him, for "tun" are appreciated as food by the Siamese peasantry, and are also kept as pets. Of their habits Mr. Irwin says (*in litt.*) "There were no bamboos near where I obtained my three specimens. These animals are very like the English mole in their habits and burrow about in open country leaving regular hills, and are rather unlike the larger bamboo-rat which I have always found at the foot of bamboos where they gnaw away making quite an audible sound, even though they may be some feet under ground. The country-people say that the "tun" feeds on grass-roots, etc. and grubs. There were any amount of them in the district I was in; one was caught in camp within five yards of my tent. Village

\* *vide* Horsfield, *loc. cit. sup.*

children sometimes keep them as pets in jars—they eat their way out of wooden cages, or even out of a kerosine oil tin if there is any rent in it. The “tun” is an inhabitant of “Pa deng” or red jungle, *i.e.*, dry jungle of a somewhat open nature such as bamboo country or very open glades with clumps of trees in districts which are not subject to inundation.”

Measurements of *Cannomys* in millimetres.

Number .. .. .	2149	2150	2535	2534	2533	2467
Sex and age .. .. .	♀ ad.	♀ ad	ad.	ad.	ad.	♂ subad
Head and body .. .. .	207	215	—	—	—	—
Tail .. .. .	64	59	—	—	—	55*
Hindfoot, s.u. .. .. .	31	30	30.5*	27*	26*	29*
Ear .. .. .	13	13	—	—	—	—
Skull and teeth:—						
Greatest length .. .. .	46.3	46.2	48	—	42.7	—
Condyllo-basilar length ..	43.2	43	44.2	—	38	—
Palatilar length .. .. .	26.8	26.4	27.1	24	23.7	22
Diastema .. .. .	17.2	17	17.7	15	15	14
Upper molar series (alveoli)	10.7	10.4	10.8	10.1	9.7	10
“ “ “ (crowns)	9	9	10	9.1	8.9	8.1
Palatal breadth between ) anterior roots of <i>m.</i> 2)	3	2.9	3	2.3	2.3	1.9
Nasals .. .. .	16.5 x 6.2	16.1 x 6.3	17 x 6.5	—	15 x 5.3	13.5 x 4.7
Interorbital breadth ..	9.8	9.2	10	—	8.3	9.2
Zygomatic breadth ..	34	34	35.2	—	31.2	29.3
Auditory breadth .. .. .	25	25.6	26.3	—	23.4	—
Braincase breadth .. .. .	19.8	19.4	20.9	—	19	19
Least breadth between ) ridges on frontals )	2	1.7	2.1	—	1.3	2.8

\* from dried skin.

44 *Lepus siamensis*

Bouhote, P. Z. S. 1902, i, p 40; Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl., 57, No 2, p. 49, (1917)

2 subad. examples, Chengmai, N. Siam (topotypes). Nos. 2531-2.

1 adult example, Paknampo, Central Siam.<sup>1</sup> No. 2122.

2 ♂ subad., 1 ♀ subad., Lopburi, Central Siam. Nos 2123-5.

1 ♀ ad., Muak Lek, E. Siam between Ayuthia and Korat. No. 2105

1 ♂ subad., 1 ♀ ad., 1 ♀ juv., Koh Lak, S. W. Siam. Nos. 2444-5, 2402

2 ♂ subad., 1 ♀ subad., Mouth of Pran River, S. W. Siam.<sup>2</sup> Nos. 2536-8.

In colour all these specimens agree closely with Bouhote's description of the type.

Above warm buff and black, the latter nearly absent on the sides and limbs, the shoulders tinged with ochraceous; the hindlimbs ochraceous-buff, the forelimbs and nape nearly ochraceous, all without any black element. Top of muzzle and head ochraceous and black, sides of muzzle to eyes dull whitish. Ears finely grizzled ochraceous-buff and black, the latter in excess; the edges fringed with buffy hairs palest posteriorly; inner side of tips ochraceous-buff, outer side blackish. Tail above pure brownish-black, below white. Sides and front of neck avellaneous-buff, the hairs frequently slightly blackened; fore-chest rather more ochraceous; throat and underparts of body white, this colour extending down the inner sides of the hindlimbs and less distinctly on to the inner sides of the feet.

The dorsal hairs are pale grey at base becoming tinged with buff higher up, next broadly annulated with black, or blackish-brown, and buff and finally tipped with black.

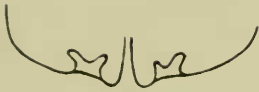
As compared with the type of *peguensis* Blyth (the only one available of that form and unfortunately lacking the posterior portion

<sup>1</sup> Mr. K. G. Gairdner coll.

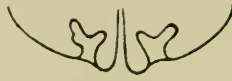
<sup>2</sup> Messrs. W. J. F. Williamson & M. A. Smith's collectors.







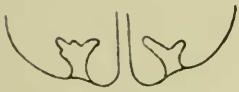
2402



2532



2124



2125



2531



2444



2445



2123



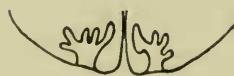
2122



2538



2537



2536



2105

of the zygomata, lower part of the cranium, basioccipital and bullae), skulls are essentially similar, but on the whole the nostrils are less acutely pointed behind; the postorbital processes do not quite touch the cranium posteriorly, though in one example there are indications that contact might occur; the palatal foramina are narrower and the palate bridge broader. The anterior feet of the zygomata are well expanded; the basioccipital is very variable in shape and cannot be relied on for purposes of differentiation.

As regards the teeth the incisor groove in *peguensis* (type) is essentially bifurcate, with the outer branch again forking<sup>1</sup>; in the series of *siamensis* the groove is well-filled with cement but is extremely variable otherwise. In the leveret (No. 2402) it is bifurcate, but in older animals the evolution can be clearly traced (Nos. 2532, 2124, 2444, etc.) of the three-branched pattern found in other individuals which is probably typical (Nos. 2445, 2123, 2122). The most eastern and southern specimens exhibit, on the whole, a much more complicated groove than the others, as they have four, and even five, branches (Nos. 2536-8, 2105)

The present series, though it does not come from one place, is undoubtedly of one form only, and serves well to illustrate Forsyth-Major's conclusions<sup>2</sup>:—"Specimens of the same species may vary slightly owing partly to individual variation. But the shape of the enamel fold varies equally at different stages in the age of the animal; species whose incisors show the most complicated pattern in the adult have as yet no trace of this in very young animals; and *vice versa* in very old specimens complication tends to disappear again. As shown by several of the text-figures, slight variations between the right and left incisor of the same individual also occur."

The incisor groove is a feature that can only be depended on within wide limits for separation of different forms.

*Lepus siamensis* does not seem to differ markedly from *L. peguensis*, and is distinguished by the absence of any white on

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<sup>1</sup> *vide* Records of the Indian Museum, XV., p. 92, fig. 11 (1918).

<sup>2</sup> Trans. Linn. Soc. VII, Zoology, p. 466. (1899).

the upper surface of the hindfeet and perhaps by the more independent branching of the incisor groove when trifurcate. Mr. T. H. Lyle, who collected the type, tells me that it was perhaps rather immature, an opinion that is borne out by the description of the grooves. He has sent me a series of external measurements (which are given below) and furnishes a curious belief held by the Siamese with regard to this animal: "The peasantry believe that there is no male hare, just as they believe there is no male paddy-bird"\*—an interesting parallel to the "she" by which the hare is always referred to at home.

Hares are reported to occur in Bangtaphan and Patiyu the next districts southwards of Pran, but no farther down the Malay Peninsula.

	Locality.	Sex.	H. & B.	Tail.	H.f.	Ear.
Nan, North Siam	... ..	♂	460	55	105	84
" "	" .. .	♂	484	84	106	87
" "	" .. .	♂	475	82	101	90
" "	" .. .	♂	440	73	102	87
" "	" (immature)	♂	470	78	105	86
" "	" .. .	♀	400	77	99	83
" "	" .. .	♀	492	82	110	91
Chiengmoan, west of Nan (2 foetuses)		♀	465	77	102	93
Lampang, North Siam (2 foetuses)		♀	440	68	96	86
Mehongson, west of Chiengmai, N. Siam		♂	428	70	100	84
Between Bangkok and Paknampo, S. Siam		♀	485	77	106	89

For other measurements see table *postea*.)

#### 45. *Acanthion brachyurus klossi*.

*Acanthion klossi*, Thomas, Ann. & Mag. Nat. Hist. (8) XVII, p. 136, (1916); Kloss, P. Z. S., 1916, p. 61.

*Acanthion brachyurus klossi*, Kloss, Journ. N. H. Soc. Siam, III, p. 65, (1918).

A long shot at a porcupine on Koh Mesan only produced some dropped quills; the animal was doubtless an individual of this form, which has a known range from Tenasserim to the border of Cambodia.

\* *Babidens coromandus*.

## UNGULATA.

46. *Bos gaurus readi*.

*Bos gaurus readi*, Lydekker, Zoologist, ser 4, VII, p. 266 (1903);  
id, Game Animals of India, etc., p. 60-62, fig 5 (1907).

A pair of detached horns, exact locality unknown.

Though short (length along outer curve  $23\frac{1}{4}$  inches) these horns are very massive for their length having a basal girth of 17 inches.

Mr. K. G. Gairdner (in Journ. N. H. Soc. I. p. 113 and plate) gives measurements of some Siamese heads and figures two pairs which show what very different forms the horns of this species may take: Gyldenstolpe (Kungl. Sv. Vet. Akad. Handl. 57, No 2, p. 57, pl. 1, fig 3) figures as *B. g. readi* a very extraordinary trophy from Prachuap Kirikan, S. W. Siam, with the bases of the horns much swollen and rugose and nearly touching on the intercornal ridge: it is, however, in several ways more suggestive of a banteng than of a gaur.

Practically all Siamese specimens have been obtained in the north or west.

(I am indebted to Mr. W. E. Trotter for these horns and four pairs of the *Cervus* antlers mentioned below)

47. *Capricornis sumatraensis annectens*, subsp. n.

Intermediate between *C. s. sumatraensis* and *C. s. milne-edwardsi* of Szechuan. Differs from the first in having the lower parts of the limbs largely rufous, and from the latter in having the rufous colour not extending above the knees and hocks.

General colour black but the bases of the hairs on back and sides of body largely white, giving a grizzled appearance to the pelage. Mane very variable in size and colour but white basally; anteriorly the hairs nearly always largely black; posteriorly the distal portion of the hairs variable, black or chocolate or pale drab: sometimes with a few entirely dark hairs intermixed. Tail with a few rufous or albescent hairs.

Outer surface of ears with many rufous hairs basally, inner surfaces white. Extremity of muzzle and the lips white; a large

rufous and white throat patch, broadest posteriorly, continuous with the white of the lips and with it surrounding a black chin-patch.

Limbs black or blackish brown to the knees and hocks, below which they are variable in colour : a considerable amount of rufous present, and always the back of pasterns and the hair surrounding the upper digits rufous : sometimes the shanks are completely rufous, sometimes rufous in patches, and sometimes mingled rufous and black.

1 ♂ imm., 1 ♀ juv. Koh Lak, S. W. Siam. 11th Nov., 1916. Nos. 2413,4/CBK. Other specimens:—an example from Koh Lak shot by Mr. T. S. Butler (*vide* Irwin, Journ. Nat. Hist. Soc. Siam, I, p. 21); a female from near Si-sa-wad, Quaa Yai River, Western Siam, shot by Mr. K. G. Gairdner (*vide* Gairdner, *ibid*, p. 254). Both in the British Museum.

The typical locality may be taken as Kok Lak though this is probably nearly the extreme southern limit of the range. The form apparently extends north to meet *C. s. milne-edwardsi*, at least as far as the Shan States, and it also seems to inhabit Pegu.

I deliberately refrain from selecting a type in this instance, as my experience of serows is that they exhibit so considerable an amount of individual variation that a single example may give a false idea of the characters of a race. As I am going into the subject of Siamese and Malayan serows at some length in a paper for this Journal, I shall not deal with the present form in further detail here; the variation, however, is probably greater than suggested above.

I am by no means certain that the various recognised serows are all subspecies of *sumatraensis*, but I prefer to regard them as such at present, and to consider that the inosculation which to some extent occurs, is due to irregular gradation caused by individual variation, and also perhaps to wandering habits. Serows are not lowland animals, and when they leave a hill for the plains, as they sometimes do, and not return to it, it may be necessary for them to travel considerable distances before they find another suitable home. This may be the explanation of

overlapping in certain places, such as the Koh Lak Peaks, where the present form occurs in association with animals in which the lower legs are almost entirely black.

My specimens were shot on the rugged limestone hill which forms the southern extremity of Koh Lak Bay. Near it are some limestone islets, one of which about a hundred yards to seaward is connected with the mainland hill by a reef almost dry at low tide; it was on this that Mr Butler obtained his specimen, but it is well known locally that the serows swim to and fro between mainland and islands.

#### 48. *Cervus unicolor equinus* Cuv.

*Cervus unicolor* subsp, Kloss, P. Z. S. 1916, p. 62.

*Cervus unicolor equinus*, Kloss, Journ. N. H. Soc. Siam, II, p. 28 (1916).

Two pairs of antlers, exact locality unknown.

Indistinguishable from Sumatran and Malayan examples with the inner hinder tine of the terminal fork much shorter than the anterior outer one.

The measurements and figure of a particularly fine pair of Siamese antlers are given by Mr. K. G. Gairdner in the Journal of the Natural History Society of Siam, Vol. I, p. 117 and plate (1914).

#### 49. *Cervus eldi siamensis*\*

(PLATE 8).

*Cervus eldi siamensis*, Lydekker, Cat. Ung. Brit. Mus., IV, p. 104 (1915)

*Panolia platyceros*, Gray, List Mamm. Brit. Mus. p. 181 (1843):  
Blyth, P. Z. S. 1867, p. 842, text figs 20-23, p. 841.

*Cervus eldi platyceros*, Auct., Gairdner, Journ. Nat. Hist. Soc. Siam, I, p. 113 (1914).

Three pairs of antlers, exact locality unknown.

Two of the specimens are of normal size but the third pair, which I purchased in Bangkok, is an unusually fine example not only in length but in massiveness also. Greatest dimensions are:—

Length of outer curve (exclusive of the brow tine)	36 inches.
"    " brow tine along lower side	13 $\frac{1}{4}$ "

\* If this deer is regarded as belonging to a genus distinct from *Cervus*, i. e., *Rucerrus*, it should then be called *Rucerrus eldi platyceros* (Gray).

Length along outer curve of main antler and brow tine combined	50 inches.
Tip to tip of antlers	23 ..
Maximum width inside antlers	24½ ..
Circumference below the brow tine	8½ ..
.. above brow tine	7½ ..
.. near mid-beam (least)	5½ ..
.. above the first spike	6½ ..

The appearance of the horns is spoilt by asymmetry: there are five points on one beam and six on the other, while one brow tine has two spikes, the other only one (see plate).

Approximate weight exclusive of bone, 9 lbs.

#### 50. *Muntiacus muntjak* subsp.

*Muntiacus muntjac corrostylis*, Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl., 57, No. 2, p. 54 (1917).

1 ♂ ad. Koh Lak

1 ♂ imm. Koh Mesan off Cape Liant.

These animals are very different from the dull-coloured barking-deer of Tenasserim, *M. m. grandicornis* Lydekker, as represented by examples from Victoria Point. They most nearly resemble specimens of *M. m. peninsulae* Lydekker, from Perak, Malay States, which is a brightly coloured form (typical locality, Pangkor Id. Dindings).

Compared with the latter the apparent differences are:—in the Siamese examples the sides of the face, forehead, occiput and pelvis are much paler (more buffy, less rufous); the neck and shoulders are more ochraceous (less tinged with brown), and the median dorsal line not quite so deep a shade of rufous and not black-speckled; the lower parts of the hindlegs are a little darker in front and the feet are also darker, while the underbody is more fulvous and less tinged with brown. Whitish patches above the hoofs, a feature of common occurrence, are exhibited by both specimens.

To Siamese antlers from Petcharum, Central Siam, the name *corrostylis* was given by Gray; but material in collections is so scanty and imperfect that we do not know what the characters of typical animals are.





BROW-ANTLERED DEER OR LAMANG.  
(*Cervus eldi siamensis*, Lydekker).



I have the skull and skin (without limbs or tail) of an immature female obtained by Messrs. Elwes and Yates in the Me Wang Forest about 100 miles west of Petchabun, which geographically more nearly represents a toptype than anything else on record. It is slightly less bright than my specimens (thus seeming-ly approximating to *grandicornis*, type locality Amherst) and has the tips of the ears broadly white externally, whereas the others have only the borders of the ears white. All three animals have the inside of the ears pure white with no sign of a tawny patch at the lower edge. I propose to leave them under the specific name until better material representing *curvostylis* has been obtained.

I was told by the Siamese crew of my boat, who knew the district well, that the Koh Mesan "*i kong*" is a much smaller animal than that of the mainland.

Measurements of the Koh Lak<sup>1</sup> and Koh Mesan<sup>2</sup> animals respectively:—head and body, 940, 940; tail, 175, 170; hind foot, s. u., 285, 290; ear, 97, 98; height at shoulder, 575, 550. Skull: greatest length, 200, 184; greatest breadth, 90, 70; length of pedicel from base on inner side 88 (116 to tip of horn in the latter).

### 51. *Tragulus kanchil affinis*.

*Tragulus affinis*, Gray, P. Z. S. 1861, p. 138.

*Tragulus kanchil affinis*, Kloss, P. Z. S. 1916, p. 63; id. Journ. Nat. Hist. Soc. Siam, II, p. 86 (1916).

1 ♂ imm. 1 ♀ ad. Lat Bua Kao.

Two very typical examples with faintly indicated nuchal stripes of the same colour as the crown.

Measurements of the adult:—External dimensions taken in the flesh:—head and body, 450; tail 80, hindfoot, c.u., 115; ear, 37. Skull:—greatest length, 95; condylo-basal length, 87; basal length, 80; palatal length, 59; upper tooth row (alveoli), 32.5, crowns, 33; crowns of premolars only, 16; greatest length of nasals, 29; greatest breadth of combined nasals, 12.8; least interorbital breadth, 26.6; zygomatic breadth, 42.5; external biorbital breadth, 45.6.

1. Weight 60 lbs.

2. Horns not yet differentiated from the pedicels.

My *T. k. williamsouii* from North Siam<sup>1</sup> is not only larger but has the upper parts less blackened and of a deeper, more tawny, colour with paler, narrower throat markings; the palatal extension is shorter and broader, but the external biorbital breadth is about the same. *T. k. augustinae*<sup>2</sup> from S. Tenasserim and S. W. Siam is rather more brightly coloured and has the nuchal stripe dark and distinct.

#### EDENTATA.

#### 52. *Manis javanica*.

*Manis javanica*, Desm., Mamm. p. 377 (1822); Kloss, Journ. N. H. Soc. Siam, 111, p. 65 (1918).

1 subad., Lat Bua Kao.

Longitudinal rows of scales round the body, 17; total number of scales in the longitudinal median line, 61; number of scales in the upper median line of tail only, 29.

Head and body, 480; tail, 380; hindfoot, 80 mm. Skull:—greatest length, 90; basal length, 86; greatest breadth, 35.7 mm.

#### AN ALTERNATIVE NAME FOR *PRESBYTIS GERMAINI MANDIBULARIS*.

For the benefit of those who follow Mr. Oldfield Thomas in the use of *Pithecus* as the generic name for the langurs or leaf-monkeys, I name the animal of Koh Chang S. E. Siam, *Pithecus germaini changensis* as well as *Presbytis germaini mandibularis*, under which its description will be found in P. Z. S. 1916, p. 32. The combination *Pithecus mandibularis* is preoccupied, having been applied by Elliot to a macaque from Western Borneo (Proc. U. S. Nat. Mus., 38, 1910, p. 347); as, therefore, whenever the Koh Chang leaf-monkey is placed in *Pithecus* it will be without a name, I provide it with one as above.

C. BODEN KLOSS.

<sup>1</sup> Journ. Nat. Hist. Soc. Siam, 11, p. 88 (1916).

<sup>2</sup> Kloss, Journ. Fed. Malay States Mus., VII, p. 254 (1918).

Measurements of *Tupaia* spp. from Siam.

Species and Locality	Sex	Head and body	Tail	Hind-foot, s. u.	Ear	Greatest length	Basal length	Palatal length	SKULL							Remarks
									Tip of snout to incisive notch	Rostral breadth at nasema	Inter-orbital breadth	Zygomatic breadth	No.			
<i>Tupaia glis bechleri</i>																
Koh Lak, S. W. Siam.	♂	172	165	40.5	15	47	40.9	24.1	15	19	6.3	11.4	25	2399	Adult	
"	♂	172	183	42.5	14.5	50	44	26	15.2	20	7.1	14.6	25.8	2403	"	
"	♀	177	181	41	16	48.4	42.6	25.3	15.3	19.2	6.1	13.5	24.6	2415	"	
"	♀	175	185	39.5	16	49	42.3	25.7	15	19.1	6.1	14.2	25.1	2418	"	
"	♂	180	167	38	15.5	47	41.8	24.8	15	19	6	13.3	25	2427	"	
"	♂	188	182	42	15	48	42.3	25.2	15.1	19	6.2	14.2	25	2428	Sub-ad.	
"	♂	187	171	40	15.5	48.4	42.5	26.5	15	19.1	7	14	25.3	2429	"	
<i>Tupaia</i> near <i>Cape Liant</i> , S. E. Siam																
"	♀	193	182	42	17	50.3	43.3	26	15.2	19.3	7	15.5	25.5	2376	Adult	
"	♂	180	175	39.5	16.5	48	41.4	28.4	14.6	18	7	13.1	25.2	2153	"	
"	♂	176	177	42	15	49	43	26	14.5	20	6.2	14.1	25	2160	"	
"	♂	193	187	42	15	50.3	43.5	25.7	15	20	6.9	15.1	26.1	2172	"	
"	♂	192	173	41	16	50	43.1	25.5	14.5	18.9	6.9	14.2	25.8	2190	"	
"	♂	180	170	38.5	15	47.6	40.1	24	14.6	18	6	14	24.6	2154	"	
<i>Tupaia glis olivacea</i>																
Pak Bu. Taehin, Central Siam	♂	223	196	44	—	52.3	45.7	28	14.7	21.2	8	14	27.6	2207	Adult	
"	♂	195	198	41	—	52.2	45.2	28	14.5	20.8	7.6	14.9	27	2208	"	
"	♀	188	185	43	16	50.7	—	27	14	20.6	7.6	14.7	27	2205	"	
"	♀	178	185	41	16	51.4	44.9	28.1	14	20.5	7	14.9	—	2206	"	

Measurements of *Pteroptis* spp. from Siam.

		<i>P. v. malaccensis</i>										<i>P. lylei</i>		
Number	..	2314	2338	2342	2346	2339	2341	2340	2349	2315	2351	2343	2417	2451
Sex and age	..	♂ ad.	♂ ad.	ad.	♀ ad.	♂ ad.	♀ ad.	♂ ad.	♀ ad.	♀ ad.	♂ ad.	ad.	♂ ad.	♀ ad.
Head and body	..	322	296	292	292	295	295	295	312	309	312	248	248	225
Forearm	..	198	193	200	200	202	207	192	203	209	205	147	138	35
Ear from orbit	..	38	41	44	44	40	40	44	40	43	42	35	35	35
Lower leg	..	96	92	94	94	98	91	98	95	105	97	69	65	65
Hindfoot, s. u.	..	55	55	59	59	61	56	52.5	56	60	57	45	45	42
Skull and teeth														
Sagittal crest	..	heavy	heavy	heavy	heavy	medium	medium	medium	medium	medium	slight	slight	nil.	nil.
Total length to gnathion	..	80	79	78	79	75.5	74	77	77	81.2	77	80	62	61
Pubation to incisive foramina	..	38.5	38.3	38	39	36.6	36.3	37.5	37	40.8	37.7	38.5	30	29
Point of orbit to tip of nasals	..	26	25.2	26.6	26.2	24.2	25.8	25	24.2	28.3	26	26.4	20	19.6
Width of braincase at zygomatica	..	27.8	26	26.5	26.8	27.6	26	26.1	26.1	26.8	27	27	21.2	22.6
Zygomatic width	..	45	41.8	41	38.3	40	37.2	40	42.2	42	44	42	37.5	34
Width across m <sup>1</sup> externally	..	22	20	22	20.8	19.9	19.5	20	21	21.2	21	21.5	16.9	17.5
Postorbital constriction	..	9	8	9	10.1	10	8.2	9.2	8.5	10.3	12	10	10.1	8.3
Interorbital constriction	..	11	10	11	11	10.2	10	10.5	10.5	11	12	10.2	9.5	8.6
Width of mesopterygoid fossa	..	9.2	8.1	8.4	8.5	8.1	8	7.3	8	8.8	9	9.2	8	7.7
Between p <sup>3</sup> -p <sup>4</sup> internally	..	12.1	10.6	12	11.5	11	10.5	10.7	10.3	11.3	12	12.1	10.1	9.9
Between cingula of canines	..	9	7.6	8	7.5	6.8	6.5	7.5	7.3	7.9	8.3	7.9	7	6.9
Orbital diameter	..	16.8	16.5	16.3	17.1	15.2	16.8	15.6	16.2	16.9	16	16.5	13.8	13
Mandible, length	..	63	61.2	60	62.2	60.2	59.2	60.6	61	61	60.2	62.2	48.1	49
"    coronoid height	..	30	29.1	28.4	29.4	31.2	28	28.4	30.3	29.2	30.7	30.2	21.4	21
Upper teeth, c-m <sup>2</sup>	..	29.7	30	28.8	30	28.8	29	28.8	30	31	30	29	23.7	22.9
Lower teeth, c-m <sup>2</sup>	..	34.8	33.5	32.8	36	31.6	32.8	33.8	33	34	32.8	34	26	25.6

Measurements of *Sciurus* spp. from Siam.

Species and Locality	Sex	Head and body	Tail	Hind foot, s. n.	Ear	Greatest length	Condyl. basilar length	Palatal length	Diastema	SKULL						No.	Remarks
										Type molar row (alveoli)	Median nasal length	Inter-orbital breadth	Zygomatic breadth	Length	Condylo-basilar length		
<i>Sciurus caniceps caniceps</i>																	
Lat Bua Kiao, E. Siam	♂	248	267	55	23	58.2	50	25	13.8	11	16.7	20.9	33.3	2145	Adult		
<i>Sciurus caniceps inexpectatus</i>																	
Koh Lak, S. W. Siam	♀	200	220	46.5	18.5	55.5	46.2	23	12.3	11	17	20	32.8	2390	"		
"	♀	223	207	45	20.5	—	—	—	—	—	—	—	—	2391	"		
"	♀	220	215	47	20	54	45.2	21.8	11.5	10.7	15.1	20	32	2398	"		
"	♀	220	215	48.5	19.5	53.5	45.3	22.3	12.2	10.1	15.4	18.3	30	2421	"		
"	♀	194	—	47	19.5	55	46	22.8	12.4	10.5	17.5	18.3	30.7	2434	" Type		
<i>Sciurus atrodorsalis pranis</i>																	
Koh Lak, S. W. Siam	♀	205	202	47	20	52	43.3	20	11.3	9.8	13.7	18	30	2393	"		
"	♀	211	200	47	21	51.7	43.7	20.8	12	9.7	14.1	17.5	30.4	2394	"		
"	♂	208	193	49	19.5	51.9	44	21.5	12	10	16.6	18.7	29	2395	" Type		
"	♀	208	197	48	21	51	42.9	20.5	11.5	10	14.6	18.1	30	2404	"		
"	♀	217	218	50	21	52	44	21	11.6	10	16	18	30	2405	"		
"	♂	205	200	47.5	21	51.5	43.2	20.5	11.6	9.2	15	18	29.8	2424	"		
"	♂	203	203	48	20	50	42	21	11	10	13.8	18.7	30	2425	"		
"	♀	215	—	50	18.5	52.4	44	21.3	12.3	9.8	14	18.3	30	2426	"		

Measurements of *Sciurus* spp. (continued).

Species and Locality	Sex	Head and body	Tail	Hind foot, s. u.	Ear	SKULL										No.	Remarks
						Greatest length	Condylar length.	Palatine length.	Basisternum	Upper Molar row (alveoli)	Median nasal length	Intra-orbital breadth	Zygomatic breadth				
<i>Sciurus atrotauroisols tchin</i>																	
Tchin, Central Siam	♂	175	155	43	18	44.5	38.4	18.8	10.6	8.5	12.2	15.8	27.2	2113	Adult		
"	♀	177	163	43	18	46	37	17.4	10.2	8.3	11	16.1	27.6	2200	"		
"	♀	179	165	40		45	37.3	18.3	10	9	12.2	16	27.2	2210	"		
"	♀	160	166	38		41	36.3	17.5	9.6	8.1	11.1	15.5	27.6	2212	"		
"	♀	206		42		46	38	18.2	10	8.8	13.1	16.2	27.7	2213	" Type		
"	♀	188	145	41		45	37.8	18	10.4	8	12.8	16	26.4	2214	"		
"	♂	202	151	39		41	36.8	18	10	8.2	11.2	15	26	2215	"		
"	♀	180	160	42.5	17	44.2	36.8	18.1	10.1	8.5	11	16	27	2219	"		
<i>Sciurus nor.</i>																	
Satulip, near Cape Lunt, S. E. Siam																	
"	♀	222	228	51	23	54.2	46.2	23	13	10	16.5	19	32	2363	"		
"	♀	240	250	54	21.5	56.3	48	23.6	12.6	10.2	17.2	20.3	32.3	2372	"		
"	♀	220	235	50.5	22	56	47	23.1	13	9.7	16.4	19	32	2374	"		
"	♂	228	235	53	21.5	55	46	22.7	13.1	9.5	16.7	20	31.6	2375	Aged		
"	♂	237	230	53	22.5	55	46.3	22.6	12.1	10	16.3	19	32.3	2380	"		
"	♀	223	227	54	22	55.2	46.8	23	12.2	10.7	17.1	18.9	32	2382	Adult		
"	♀	225	225	51	21.5	54	45.8	22.4	12.6	10	14	19	32.1	2383	Aged		
"	♀	225	225	53.5	22	51.5	46.2	23	13	10	17.2	19	31.2	2384	Adult		
"	♀	220	225	51	21.5	51.3	46	22	12	10.2	16.5	20	32	2385	Aged		



Measurements of *Sciurus* spp. (continued).

Species and Locality	Sex	Head and body	Tail	Hind foot, s. u.	Ear	SKULL							No.	Remarks	
						Greatest length	Condylobasilar length	Palathar length	Diastrama	Upper molar row (alveoli)	Median nasal length	Inter-orbital breadth			Zygomatic breadth
<i>Sciurus fulvipes taylori</i>															
Lat Bua Kao, E. Siam.	♀	240	220	51	19.5	55.5	47	23	12.7	11	17.2	20	33.2	2132	Adult
"	♂	241	224	54	22	57	48.8	23	13	10.3	17	21.3	35	2135	"
"	♂	240	250	52	20	56.7	48	23	12.2	11	16	19.2	32	2140	Aged
"	♂	230	227	51	20	55	46	23	12.8	10	17	19.8	32.3	2141	Adult
"	♀	240	220	53	21	56	47	23	12.8	10.6	17	19.3	32.7	2143	"
"	♀	235	245	55	22.5	56.2	47	23	12	10.2	16.1	21	32.2	2146	Aged
"	♂	230	215	53.5	20	56	46.2	22.2	12	10.4	17	19.5	32.1	2165	Adult
"	♂	233	230	54	22	56	47	22.6	12.8	10.3	17	20.2	33.3	2173	Aged
"	♂	210	230	51.5	20.5	54.4	46	22.1	12.1	10.2	16.4	20	32	2185	Adult
<i>Sciurus fulvipes taylori</i>															
Koh Lau Id., Imer Gulf of Siam	♀	193	177	43.5	18.8	48	40	19.8	10.1	9.	14	17.6	29	2244	Adult
"	♀	186	174	42.5	18	47.5	40.3	19.1	10.5	8.8	14.1	—	28	2248	"
"	♂	185	160	43	17	47	38.3	19	10.1	8.6	13	16.4	27.2	2250	"
"	♂	190	170	44.5	17.5	47	39.5	19.2	10.1	9	12.8	17	28	2251	"
"	♀	190	165	43	18	47	39.3	19.3	10.2	8.9	13.1	17.6	28.6	2255	"
"	♀	185	180	43	17	47.1	39.7	19.5	10	9	14	17	28.1	2256	"
"	♂	188	172	44	18	47.3	40	19.6	10.1	9	13.4	17.1	27.8	2266	"
"	♀	174	166	44	18	47	38.9	19.2	10.6	8.9	12.8	16	27.4	2272	"

Measurements of *Macaca* subsp. from Siam.

Species and Locality	Sex	Head and body	Tail	Hind foot, s. d.	Ear	SKULL.										No.	Remarks
						Crest length	Condylar-basilar length	Palatal length	Posterior length	Upper molar row (alveoli)	Median nasal length	Interorbital breadth	Zygomatic breadth				
<i>Macaca leonina</i> (Linnaeus)																	
Hu Hu, Pinn, S. W. Siam	♂	175	67	41	16	47	40.5	22	12	10	13.6	13	25	2510	Adult		
"	♀	185	140	39	17	48	41.5	23.2	12.8	10	15.2	13	26	2511	"		
<i>Macaca leonina</i> (Linnaeus)																	
Lat Bha Kao, E. Siam	♂	190	80	41	18.5	50	43	22.8	13.2	9.4	11.2	12.6	26.8	2117	"		
"	♀	188	145	39	20	47.2	41.5	22	12.6	10	15	11.4	26	2503	Adult		
Pak Jong	♂					49.5	42	23.6	13.1	10	15	13.2	26.6	2108	Sub-ad.		
Siddap, near Cape L. Ind.	♂	193	102	42	19			24.1	11	10	11	13.1		2365	"		
"	♀	191	121	41	20	49.4	42.5	22.6	12.9	9.8	13.2	13.1	27.2	2378	"		
<i>Macaca leonina</i> (Linnaeus)																	
Me. Tav, Ratchag., W. Siam,	♂	179	160	40.5	20		42.2	23.2	12	10	13.4	11.8	26	2618	Adult		
1500 ft.	♀	180	140	41	20	49.5	42.1	22.1	12	9.9	13.8	11.4	25.5	2649	"		
Sikwan	♂	192	118	40	19.5	50.1	44.1	23.2	13.1	10.1	14	12.1	26.5	2650	"		

Measurements of *Meles meles* subsp. (continued).

Species and Locality	Sex	Head and body	Tail	Hind foot, s. u.	Ear	SKULL								No.	Remarks
						Greatest length	Condylar length	Palatine length	Disterna	Upper molar row (alveoli)	Median nasal length	Interorbital breadth	Zygomatic breadth		
<i>Meles berdmorei peninsularis</i>															
Ban Kok Klap, Nakhon Sri-tammarat, Peninsular Siam	♂	195	112	41.5	19.5	48	49.5	22	12	9.9	12.3	13.1	26	101.13	Adult
"	♀	192	133	49.5	19	48.3	41.2	23	13	9.1	14	12.2	26.4	102.13	"
"	♀	193	148	41	20.5	49	41.7	23	12.1	10.1	13.8	12.6	25.2	105.13	"
"	♀	195	137	41	19	50	42	22.8	12	10.4	14.1	12.7	27	106.13	" Type
"	♂	196	149	43	20	50	42.8	23	12.4	10.2	14	12.5	26	109.13	"
"	♀	199	135	41	17.5	50	42	23	13.2	9.6	14.1	12.2	27	113.13	"